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R3465

Modulation Spectrum Analyzer

Maintenance Manual

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Safety Summary

To ensure thorough understanding of all functions and to ensure efficient use of this instrument, please read the manual carefully before using. Note that Advantest bears absolutely no responsibility for the result of operations caused due to incorrect or inappropriate use of this instrument.

If the equipment is used in a manner not specified by Advantest, the protection provided by the equipment may be impaired.

■ Warning Labels

Warning labels are applied to Advantest products in locations where specific dangers exist. Pay careful attention to these labels during handling. Do not remove or tear these labels. If you have any questions regarding warning labels, please ask your nearest Advantest dealer. Our address and phone number are listed at the end of this manual.

Symbols of those warning labels are shown below together with their meaning.

DANGER: Indicates an imminently hazardous situation which will result in death or serious personal injury.

WARNING: Indicates a potentially hazardous situation which will result in death or serious personal injury.

CAUTION: Indicates a potentially hazardous situation which will result in personal injury or a damage to property including the product.

■ Basic Precautions

Please observe the following precautions to prevent fire, burn, electric shock, and personal injury.

- Use a power cable rated for the voltage in question. Be sure however to use a power cable conforming to safety standards of your nation when using a product overseas.
- When inserting the plug into the electrical outlet, first turn the power switch OFF and then insert the plug as far as it will go.
- When removing the plug from the electrical outlet, first turn the power switch OFF and then pull it out by gripping the plug. Do not pull on the power cable itself. Make sure your hands are dry at this time.
- Before turning on the power, be sure to check that the supply voltage matches the voltage requirements of the instrument.
- Be sure to plug the power cable into an electrical outlet which has a safety ground terminal. Grounding will be defeated if you use an extension cord which does not include a safety ground terminal.
- Be sure to use fuses rated for the voltage in question.
- Do not use this instrument with the case open.

- Do not place objects on top of this product. Also, do not place flower pots or other containers containing liquid such as chemicals near this product.
- When the product has ventilation outlets, do not stick or drop metal or easily flammable objects into the ventilation outlets.
- When using the product on a cart, fix it with belts to avoid its drop.
- When connecting the product to peripheral equipment, turn the power off.

■ Caution Symbols Used Within this Manual

Symbols indicating items requiring caution which are used in this manual are shown below together with their meaning.

DANGER: Indicates an item where there is a danger of serious personal injury (death or serious injury).

WARNING: Indicates an item relating to personal safety or health.

CAUTION: Indicates an item relating to possible damage to the product or instrument or relating to a restriction on operation.

■ Safety Marks on the Product

The following safety marks can be found on Advantest products.

: ATTENTION - Refer to manual.

: Protective ground (earth) terminal.

: DANGER - High voltage.

: CAUTION - Risk of electric shock.

■ Precautions when Disposing of this Instrument

When disposing of harmful substances, be sure dispose of them properly with abiding by the state-provided law.

Harmful substances:
(1) PCB (polycarbon biphenyl)
(2) Mercury
(3) Ni-Cd (nickel cadmium)
(4) Other
Items possessing cyan, organic phosphorous and hexadic chromium and items which may leak cadmium or arsenic (excluding lead in sol der).

Example : fluorescent tubes, batteries

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1 GENERAL INFORMATION

1.1 Introduction

This manual has information to perform assembly level trouble shooting of R3465

spectrum analyzer. Included removal/Installation procedures of instrument's printed circuit board or module assemblies and a parts list.

This manual intend to use by service trained personnel only.

Detailed operation and programming information is excluded from this manual.

Including only sufficient information for service purpose. For more detailed operating information, refer to the R3465 Spectrum Analyzer operation manual.

WARNING: ***The information in this manual is for use of Service Trained Personnel only. To avoid electrical shock, to do not perform any procedures in this manual or do any servicing to the R3465, unless you are qualified to do so.***

1.2 Outline of Product

The R3465 is a spectrum analyzer, which can analyze digital modulation such as measurement of modulation accuracy, transmission velocity, etc. in addition to conventional spectrum analyzing.

The key features of R3465 are follows:

(1) The measurement frequency range is between 9kHz to 8GHz, which can cover digital radio frequency fully. Also the span accuracy of under ± 1%(span ≤ 5MHz) is realized by introducing DDS(Direct Digital Synthesizer) system.

Measurement frequency range	:	9kHz to 8GHz
Frequency stability	:	Residual FM ; under 3Hzp-p/0.1S
		Drift ; under 20Hz
Frequency span accuracy	:	under ± 1%(span ≤ 5MHz)
Resolution bandwidth	:	5MHz maximum/

(2) TRANSIENT mode is equipped which measures modulation accuracy of digital modulation signal/ burst signal, OBW, ACP, etc at high speed.

(3) Parameter for standard measurements which corresponding to various communication types (PHS/PDC/NADC) can be set automatically.

(4) Functions which are frequent use such as occupied bandwidth(OBW), adjacent channel leakage power(ACP), harmonic distortion measurement(HARM), etc. are put independent keys to improve the operation performance.

(5) Easy to see and easy to use are improved by introducing 6.5 inches TFT color liquid crystal display. It's also easy to carry because the weight is only 16kg.

1.3 Troubleshooting concept

The troubleshooting concept of this manual is based on error message displayed approach.

2 THEORY OF OPERATION

2.1 Introduction

R3465 is modulation spectrum consists of RF Block, SYNTHESIZER Block, IF/LOG Block, MOD Block, NADC Block, TBC Block, CPU Block, FRONT Block and Power Supply Block.

This section provides each Block's theory of operation based on Block level, which is replaceable.

Detailed components-level circuit theory is not provided.

Simplified Block diagram is shown in Figure 2-1.

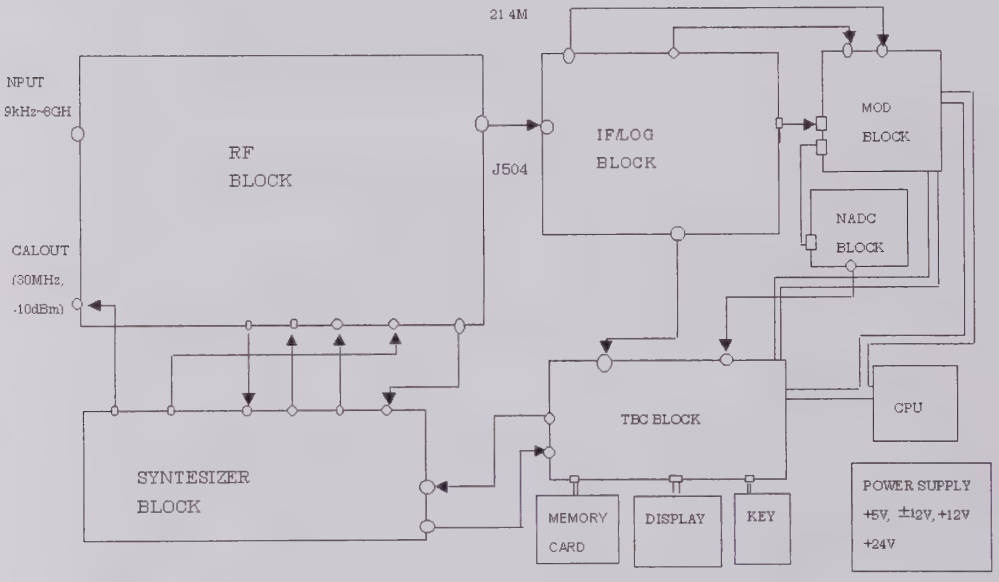

Figure 2-1 Simplified Block Diagram of R3465

2.2 RF Block

[Overview]

RF Block is a frequency converter.

The input signal frequency range is 9kHz to 8GHz. After converted signal becomes 21.4MHz IF signal.

RF Block has two ways of circuit depends on measurement frequency range.

(1) Frequency range: 9kHz to 3GHz.

(2) Frequency range: 1.7GHz to 8GHz.

RF Block consists of RF/IO circuit, RF input attenuator, YTF (YIG Tuned Filter), the two Local oscillators, mixer diodes and amplifiers.

RF/IO is controlled 1st local oscillator such as oscillation frequency and frequency sweep. Frequency referenced oscillator is located in this Block.

[Signal analysis flow]

(1) Frequency range: 9kHz to 3GHz Band

The input signal goes through RF input programmable attenuator, which has attenuation 0dB to 70dB by 10dB step.

The signal of RF input attenuator is fed through 1st mixer diode to convert 1st IF signal (4231.4MHz) with 1st local oscillator signal (2GHz to 8GHz).

Then goes through low pass filter and band pass filter to eliminate unnecessary signal.

The 1st IF signal goes through 2nd mixer circuit to convert 2nd IF signal (421.4MHz) with 2nd local oscillator (3810MHz).

2nd IF signal goes through 3rd mixer to convert 3rd IF (21.4MHz) signal with 400MHz signal, which is generated by using 200MHz signal supplied from SYNTHESIZER Block.

1st local oscillator and 2nd local oscillator has phase locked loop circuit to stabilized its oscillation frequency.

(2) Frequency range :1.7GHz to 8GHz Band

The difference between 9kHz to 3GHz band and 1.7GHz to 8GHz band is frequency converter circuit.

It has YTF (YIG Tuned Filter) to eliminate signal such as image and multiple response of input signal and High band mixer diode.

YTF is controlled by synchronously with the spectrum analyzer tuning frequency.

The input signal goes through RF input programmable attenuator, which has attenuation 0dB to 70dB by 10dB step.

After RF input attenuator, the signal goes through 1st mixer (High band mixer) to convert to 1st IF signal(421.4MHz) with 1st local oscillator (2GHz~8GHz).

The 1st IF signal goes through low pass filter, then pass through band pass filter, which is used in Base band commonly.

This 1st IF signal goes through to 3rd mixer to convert to 3rd IF signal (21.4MHz).

The 3rd IF signal goes into IF/LOG Block.

2.3 SYNTHESIZER Block

This Block generates calibration signal on the front panel and reference signals for phase locked loop circuits in RF Block.

It is consists of YTO PLL, SAMP PLL, 200MHz PLL and DDS PLL circuits.

2.4 IF/LOG Block

IF/LOG Block consists of IF filter, step amplifier, logarithm characteristics and video filter circuit.

This Block is filtering IF signal to realize resolution bandwidth (hereafter RBW), which does RBW setting set. RBW can be set 300Hz to 1MHz in 1-3-10 sequences and 5MHz.

RBW 5MHz to 100kHz use LC filters, RBW 30kHz to 300Hz use crystal filters.

It has 10dB, 0.1dB step amplifier and 1dB step attenuator.

Video filter can be set from 1Hz to 5MHz.

The IF signal (21.4MHz) from RF Block is fed into IF filter, step amplifier and convert logarithm characteristics signal in LOG functional circuit.

After the logarithm circuit, the signal is fed through TBC and MOD Block.

2.5 MOD Block

MOD Block analyzes modulation signal such as GSM, DECT, etc.

It consists of input buffer memory, crystal oscillators for each modulation modes, ADC and DSP.

2.6 NADC

NADC is Normal Analog to Digital Converter Block.

It has Positive Peak Hold, Negative Peak Hold and sample/Hold circuits.

There are two ADC circuit.

2.7 TBC Block

TBC is time base control, which controls all the timing for spectrum analysis.

It is integrated of RF Block and IF/LOG Block control.

It generates ramp signal for YTO(YIG Tuned oscillator).

2.8 CPU Block

It consist of CPU main processor, Graphic processor and its peripheral circuit, such as GPIB interface, RS232 Interface, memory card, display control.

2.9 Display Block

Display Block has 6.5 inches color TFT display.

2.10 Power Supply Block

Power supply Block uses switching power supply unit.

It allows to connect 90VAC to 250VAC directly.

It generates +5V, +/- 12V, +12V and +24V.

3 PERFORMANCE TEST (CALIBRATION)

3.1 Introductory Description and UUT Performance Requirements

This procedure is described the performance test of the moduratoin spectrum analyzer R3465/3463 and the spectrum analyzer R3272/3263.

The unit being test will be referred to herein as the UUT(Unit-Under-Test)

UUT Environmental range :TEMP.20 °C to 30 °C RH 85% or less

UUT Warm-up/Stabilization period requirements :60 minutes

Table 3-1 UUT Performance Requirements (1 of 5)

Unit-Under-Test (UUT) Parameter/Function	Performance Specifications	Test Method
1. Frequency Read Accuracy and Maker Frequency Counter Accuracy	Frequency Read Accuracy : < ± [(Frequency reading X Frequency reference Accuracy) + (Span X Span Accuracy) +(0.15 X Res BW) + 10Hz] Span Accuracy: Span > 5MHz ±4% Span ≤ 5MHz ±1% Marker Frequency Counter Accuracy < ±[(Marker Frequency x Frequency Reference Accuracy) +(5Hz x N)+ 1LSD]	Signals are input fromhe SG where high precision frequency standard is set as the reference frequency for measurement.
2. Frequency referenceOutput Accuracy.	Frequency : 1x 10 exp -7/year < 2x10 exp -8/day	The frequency of CAL OUT signal locked to the internal 10MHz reference is measured with the counter.
3. Noise sidebands	f ≤ 3GHz : 10kHz offset < -100dBc/Hz 100kHz offset < -110dBc/Hz f > 3GHz : 10kHz offset < (-98+20 log N) dBc/Hz) 100kHz offset < (-108+20 logN)dBc/Hz)	Good noise sideband signals are input for measurement.
4. Frequency Span Accuracy	Linear Span : < ±4% (Span > 5MHz) ±1% (Span ≤ 5MHz)	Signals at two frequencies according to each span are input to measure the difference between the frequencies.

Table 3-1 UUT Performance Requirements (2 of 5)

Unit-Under-Test (UUT) Parameter/Function	Performance Specifications	Test Method
5. Resolution Bandwidth Accuracy and Selectivity	Range Accuracy : 300Hz to 3MHz,5MHz;1,3,10 sequence 20% 1kHz to1MHz ±30% 300Hz to 3MHz, 5MHz Selectivity : <15:1 300Hz to 5MHz Resolution Bandwidth 5MHz(50dB/3dB) Resolution Bandwidth 300Hz to 3MHz (60dB/3dB)	CAL OUT signals are input for measurement.
6. Resolution Bandwidth Swithching Uncertainty	300Hz to 3MHz RBW : < ± 0.3dB (Reference to 300kHz RBW) (3 x RBW ≥ Span)	CAL OUT signals are input for measurement.
7. Displayed Average Noise Level	(1kHz res BW, 0dB input attenuator,1Hz video filter) R3465 : -70dBm 10kHz -80dBm 100kHz -{115-1.55f(GHz)}dBm 1MHz to 3.0GHz -115dBm 1.7GHz to 7.0GHz -115dBm 6.9GHz to 8.0GHz R3272 : -70dBm 10kHz -80dBm 100kHz -{115-1.55f(GHz)}dBm 1MHz to 3.1GHz -110dBm 3.0GHz to 7.5GHz -103dBm 7.4GHz to 15.4GHz -96dBm 15.2GHz to 23.3GHz -90dBm 23GHz to 26.5GHz R3263/3463 : -70dBm 10kHz -80dBm 100kHz -{115-1.55f(GHz)}dBm 1MHz to 3.0GHz	No signal is input and average noise level at each frequency is measured.
8. 1dB Gain Compression	-5 dBm mixer input level > 10MHz	Two signals are input simultaneously to measure the level at which one of the signal is lowered by 1dB.

Table 3-1 UUT Performance Requirements (3 of 5)

Unit-Under-Test (UUT) Parameter/Function	Performance Specifications	Test Method
9. Residual Response	(No signal at input, 0dB input attenuator, 50Ω termination) R3465 : < -100dBm 1MHz to 3.0GHz < -90dBm 300kHz to 8.0GHz R3272 : < -100dBm 1MHz to 3.0GHz < -90dBm 300kHz to 26.5GHz R3263/3463 : < -100dBm 1MHz to 3.0GHz < -90dBm 300kHz to 3GHz	No signal is input and the test is terminated at 50Ω .
10.Second Harmonic Distortion	R3465 : frequency range mixer level < -70dBc 10MHz to 3.0GHz -30dBm < -90dBc 1.7GHz -10dBm R3272 : frequency rane mixer level < -70dBc 10MHz to 3.0GHz -30dBm < -100dBc > 3.0GHz -10dBm R3263/3463 : frequency range mixer level < -70dBc 10MHz to 3.0GHz -30dBm	The lowpass filter is connected to the SG output for measurement.
11.Third Order Intermodulation Distortion	Separation 12.5kHz Resolution bandwidth : 300Hz Video bandwidth : 3Hz or less R3465 : frequency range mixer level < -75dBc 10MHz to 3.0GHz -30dBm < -75dBc > 1.7GHz -30dBm R3272 : frequency range mixer level < -75dBc 10MHz to 3.0GHz -30dBm < -75dBc > 3.0GHz -30dBm R3263/3463 : frequency range mixer level < -75dBc 10MHz to 3.0GHz -30dBm	Two neighboring signals are input simultaneously for measurement.
12.Image,Multiple Out of Band Response	R3465 : < -70dBc 10MHz to 8GHz R3272 : < -70dBc 10MHz to 18GHz < -60dBc 10MHz to 23GHz < -50dBc 10MHz to 26.5GHz R3263/3463 : < -70dBc 10MHz to 3GHz	Signals allowing image, multiple and out of band response as against the center frequency are input for measurement.

Table 3-1 UUT Performance Requirements (4 of 5)

Unit-Under-Test (UUT) Parameter/Function	Performance Specifications	Test Method
13. Frequency Response	10dB input attenuator R3465 : ± 1.5dB 9kHz to 3.0GHz ± 1.0dB 50MHz to 3.0GHz ± 1.5dB 1.7GHz to 7.0GHz ± 1.5dB 6.9GHz to 8.0GHz Frequency Response Referenced to CAL Signal : ± 3dB 9kHz to 8GHz R3272 : ± 1.5dB 9kHz to 3.1GHz ± 1.0dB 50MHz to 3.1GHz ± 1.5dB 3.0GHz to 7.5GHz ± 3.5dB 7.4GHz to 15.4GHz ±4.0dB 15.4GHz to 23.3GHz ± 4.0dB 23GHz to 26.5GHz Frequency Response Referenced to CAL Signal : ± 5dB 9kHz to 26.5GHz R3263/3463 : ± 1.5dB 9kHz to 3.0GHz ± 1.0dB 50MHz to 3.0GHz Frequency Response Referenced to CAL Signal : ± 2dB 9kHz to 3.0GHz	The signal level of SG at a certain level on the screen is measured at each frequency with the Power Meter.
14.IF Gain Uncertainty	(After automatic calibration) ±0.5dB 0dBm to -50dBm	The REF level is raised while lowering the signal level with the SG to measure the error.
15.Scale Fidelity	(After automatic calibration) Log : ± 0.2dB/1dB, ±1dB/10dB, ±1.5dB/80dB" Linear : ±15% of reference level (within 8 Div)	Input signal is lowered with the SG for measurement.

Table 3-1 UUT Performance Requirements (5 of 5)

Unit-Under-Test (UUT) Parameter/Function	Performance Specifications	Test Method
16.Input Attenuator Accuracy	(20dB to 70dB settings referenced to 10dB) R3465 : ± 1.1dB/10dB step,2.0dB max, 9kHz to 8GHz R3272: ± 1.1dB/10dB step,2.0dB max, 9kHz to 12.4GHz ± 1.3dB/10dB step,2.5dB max, 12.4GHz to 18GHz ± 1.8dB/10dB step, 3.5dB max, 18GHz to 26.5GHz R3263/3463 : ± 1.1dB/10dB step,2.0dB max, 9kHz to 3GHz	Signal at a frequency is input and measured with the internal attenuator.
17.Calibration Amplitude Accuracy	Amplitude : -10dBm ± 0.3dB	CAL OUT signals are measured with the Power Meter.
18.CDMA (Option61) Performance Check	0.9996<Rho<1.000 Tau<± 250nSec Frequency Error<±8Hz	Use Arbitrary Waveform Gemnerator for Digital Modulation

3.2 Measurement Standards and Support Test Equipment Performance Requirement

Minimum-Use-Specifications (MUS) are the calculated minimum performance specifications criteria needed for the Measurement Standards (MS) and support M&TE to be used for the comparison measurements required in the Test Procedure (TP) process.

The MUS is developed through uncertainty analysis and is calculated through assignment of defines and documented uncertainty/accuracy ratio or margin between the specified tolerances of the UUT and the capability (uncertainty specification) required of the measurement standards system. MUS is required to assist a measurement specialist in the evaluation of existing or selection of alternate measurement standards equipment.

The uncertainty/accuracy ratio applied in this TP is 10:1 and any exception to that is indicated in Section 1.1.

CAUTION: ***The instructions in this TP relate specifically to the equipment and conditions listed in Section 1.2. If other equipment is substituted, the information and instructions must be interpreted and revised accordingly.***

MS and SM&TE Environmental Range : Temperature : 18 °C to 28 °C

: Relative Humidity : 30% to 70%

MS and SM & TE Warm-up/Stabilization Period Requirements : 60minutes

Table 3-2 Measurement Standards (MS) Performance Requirements

Equipment Generic Name (Quality)	Minimum-Use-Specifications	Note
Frequency Standard	Output Frequency : 10MHz Stability : 5x10exp-10/day Output Impedance : about 50Ω Output Voltage : 1Vpp or more	
Synthesized Sweeper	Frequency Range : 10MHz to 18GHz Frequency Accuracy(CW) : 3 x 10exp-8/day Power Level Range : -20dBm to +15dBm	SG1
Frequency Counter	Frequency Range : 10Hz to 120MHz Gate time : 10s Number of Digits Displayed : 8digits Input Voltage Range : 25mVrms to 500mVrms	
Synthesized Signal Generator	Frequency Range : 10MHz to 4GHz Residual SSB Phase Noise : 1kHz offset < -115dBc/Hz 10kHz offset < -125dBc/Hz 100kHz offset < -130dBc/Hz Power Level Range : -20dBm to +10dBm	SG2
Power Meter	Accuracy ±0.02dB(dB Relative mode)	
Power Sensor	Frequency Range : 50MHz to 26.5GHz Power Range : 1μW to 100mW Maximum SWR : 1.25(26.5GHz)	Sensor1
	Frequency Range : 10MHz to 18GHz Power Range : 1μW to 10mW	Sensor2
Synthesized Sweeper	Frequency Range : 10MHz to 26.5GHz Power Level Range : -20dBm to +10dBm	SG3
Synthesized Level Generator	Frequency Range : 200Hz to 80MHz Power Level Range : -88dBm to +13dBm Absolute Level Accuracy : ±0.05dB	SG4
Arbitrary Waveform Generator	Tek AWG2021 or Equivalent	SG5
Digital Modulation Signal Generator	Anritsu MG3607B or Equivalent	SG6
Spectrum Analyzer	Frequency Range : to 3GHz	SPA

Table 3-3 Support Measuring & Test Equipment (M&TE) Performance Requirements

Equipment Generic Name (Quality)	Minimum-Use-Specifications	Note
Adapter	Type N(m) to BNC(f)	
	Type N(m) to SMA(f)	
	SMA(m) to SMA(m)	
	Type N(f) to BNC(m)	
50Ω Termination	SMA	
20dB Fixed,3dB Fixed Attenuator	Connector : SMA(m),SMA(f)"	
Power Splitter	Frequency Range : 10MHz to 26.5GHz Insertion Loss : 6dB(nominal)	
Low -pass-Filter	Cutoff Frequency : 2.2GHz Rejection at 3GHz : >40dB Rejection at 3.8GHz : >80dB	
Power Divider	Frequency Range : 2MHz to 2GHz Isolation : >20dB	Driver1
	Frequency Range : 2MHz to 4GHz Isolation : >20dB	Driver2
Cable	Frequency Range : DC to 26.5GHz Maximum SWR : <1.45GHz at 26.5GHz Length : about 70cm: Connector : SMA(m) both ends	
	Length : 150cm: Connector : BNC(m) both ends	
	Length : 10cm: Connector : BNC(m) both ends	

3.3 Preliminary Operations

WARNING: ***Always makes sure spectrum analyzer's power supply cord is plugged into a 3-hole grounded outlet or 2-hole outlet with grounded adapter. You can be fatally shocked if you failed to follow this rule.***

Do not touch live circuits when calibrating instrument.

(1) Review this entire procedure before starting calibration procedure.

(2) Always confirm that the POWER switch is OFF before connecting power cable to the AC line.

3.4 Performance Test Process

3.4.1 Accuracy of Frequency Readout and Frequency Counter Marker

DESCRIPTION

The Accuracy of the R3465/3272/3263/3463 frequency readout and frequency counter marker is tested with an input signal of known frequency.

SPECIFICATION

Frequency Readout Accuracy < ±[(Frequency reading x Frequency Reference Accuracy)+(Span x Span Accuracy)+(0.15 x RES.BW)+10Hz]

Span Accuracy : Span > 5MHz ±4%
Span ≤ 5MHz ±1%

Marker Frequency Counter Accuracy < ±[(Marker Frequency x Frequency Reference Accuracy)+(5Hz N)+1LSD]

RELATED ADJUSTMENT

YTO Adjustment
10MHz Frequency Adjustment Reference

EQUIPMENT

Frequency Standard
Synthesized Sweeper(SG3)
Cables :
SMA,70cm
BNC,150cm

SETUP

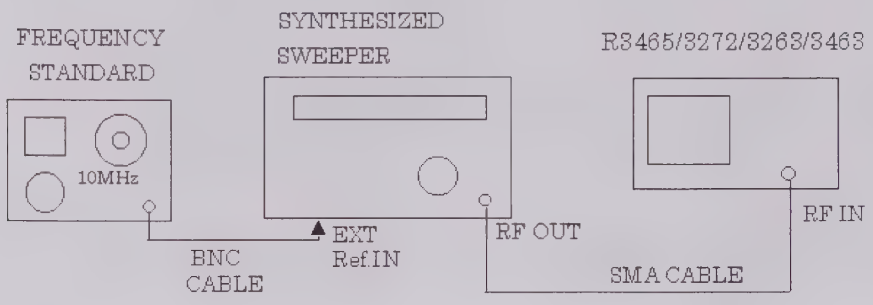

Figure 3-1 Frequency Readout and Frequency Counter Marker Accuracy Test Setup

PROCEDURE

1. Connect the equipment as shown in Figure 3-1.

[Frequency Readout Accuracy]

2. Press the INSTRUMENT PRESET key on the SG3. Set the SG3 controls as follows:
   CW 1.5GHz
   Power Level. . . . . -10dBm
   Frequency Reference. . . . . EXT(Rear Panel)

3. On the R3465/3272/3263/3463, press the SHIFT and PRESET keys and set the controls as follows:
   Center frequency 1.5GHz
   Span. 5MHz

4. For the R3465, press FREQ, *more 1/2* and *Preselector 1.7G 3.0G* keys to set the preselector to 3.0GHz.

5. On the R3465/3272/3263/3463, press the SRCH key. Record the MKR frequency on Table 3-4 as the actual Marker Reading. The reading should be within the limits shown.

6. Repeat step (5) for all the frequency and span combinations listed in Table 3-4. Peak the R3465/3272 preselector for and set the Analyzer and the SG3's CW key to frequencies of 5GHz and above.

[Frequency Counter Marker Accuracy]

7. Set the SPAN key of the R3465/3272/3263/3463 to 5MHz.
   Press the CW, *Counter*, *Preselector* and *Counter ON OFF* keys to set the counter to ON.

8. Key in the SG3 CW frequencies and the R3465/3272/3263/3463 center as indicated in Table 3-5.For each pair of settings, press the SRCH key and record the MKR frequency at each point in Table3-5.
The marker readings should be within the limits shown.

Table 3-4 Frequency Readout Accuracy

SG3 Frequency (GHz)	R3465/3272/3263/3463		Δ Marker Reading		
	Span	Center Frequency	Min. (GHz)	Actual (GHz)	Max. (GHz)
1.5	1MHz	1.5GHz	1.499988		1.500012
1.5	10MHz	1.5GHz	1.49958		1.50042
1.5	50MHz	1.5GHz	1.49784		1.50215
1.5	100MHz	1.5GHz	1.4958		1.5042
1.5	2GHz	1.5GHz	1.419		1.580
<R3465/3272 ONLY>					
5	11MHz	5GHz	4.999987		5.000013
5	10MHz	5GHz	4.99958		5.00042
5	50MHz	5GHz	4.99784		5.00216
5	100MHz	5GHz	4.9958		5.0042
5	2GHz	5GHz	4.919		5.081
<R3272 ONLY>					
11	1MHz	11GHz	10.999987		11.000013
11	10MHz	11GHz	10.99958		11.00042
11	50MHz	11GHz	10.99784		11.00216
11	100MHz	11GHz	10.9958		11.0042
11	2GHz	11GHz	10.919		11.081
18	1MHz	18GHz	17.999986		18.000014
18	10MHz	18GHz	17.99958		18.00042
18	50MHz	18GHz	17.99784		18.00216
18	100MHz	18GHz	17.9958		18.0042
18	2GHz	18GHz	17.919		18.081

Table 3-5 Frequency Counter Marker Accuracy

SG3 Frequency (GHz)	R3465/3272/3263/3463 Center Frequency (GHz)	Δ Marker Reading		
		Min. (GHz)	Actual (GHz)	Max. (GHz)
1.5	1.5	1.499999844		1.500000156
<R3465/3272 ONLY>				
5	5	4.999999494		5.000000506
<R3272 ONLY>				
11	11	10.99999889		11.000001111
18	18	17.999998184		18.000001816

3.4.2 Frequency Reference Output Accuracy

DESCRIPTION

The 10MHz reference signal is measured for frequency accuracy by measuring the frequency of the 30MHz CAL OUTPUT signal. The CAL OUTPUT signal is referenced to the 10MHz reference.

SPECIFICATION

Frequency: < 1 x 10 exp -7/year, < 2 x 10 exp -8/day

RELATED ADJUSTMENT

Frequency Reference Adjustment

EQUIPMENT

Frequency Counter

Frequency Standard

Cables:

BNC,150cm(Two required)

- SETUP

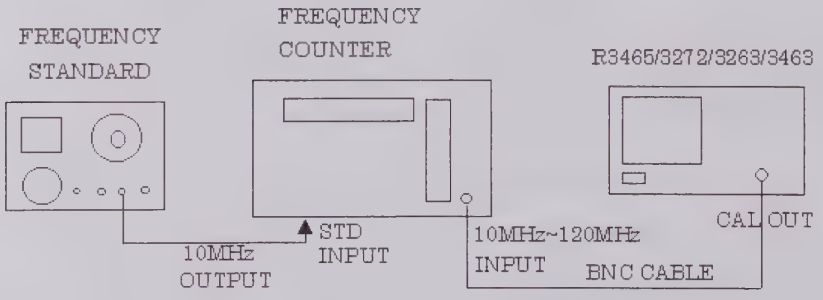

Figure 3-2 Frequency Reference Accuracy Test Setup

PROCEDURE

1. Connect the equipment as shown in Figure 3-2.

2. Set the frequency counter controls as follows:
   FREQUENCY STD SWITCH(Rear Panel) .... EXT
   GAME TIME ..... 10 sec

3. Press the SHIFT and PRESET keys on the R3465/3272/3263/3463.

CAUTION: ***Before starting this measurement,perform warm-up operation of the R3465/3272/3263/3463 for more than 30 minutes. If the frequency reference of the R3465/3272/3263/3463 is set to EXT, set it to INT or perform 15-minutes warm-up operation after instrument preset.***

4. Wait for the frequency counter to settle down.

5. (Read the frequency counter display. The frequency should be within the following limits:
   (2) *9.9999970: ≤ . . . . ≤ (2)*0.0000030
   *: The counter can display only eight digits.

3.4.3 Noise Sidebands

DESCRIPTION

The noise sidebands of a 1.5GHz,and 3.5GHz, -10dBm signal are measured at an offset of 10kHz and 100kHz from the carrier.

SPECIFICATION

Noise Sidebands:

Offset	f ≤ 3.0GHz	f > 3.0GHz
10kHz	< -100dBc/Hz	< (-98+20 logN) dBc/Hz
100kHz	< -110dBc/Hz	< (-108+20 logN) dBc/Hz

RELATED ADJUSTMENT

There is no related adjustment procedure for this performance test.

EQUIPMENT: Synthesized Signal Generator (SG2)

Cables : BNC,150cm
SMA,70cm

SETUP

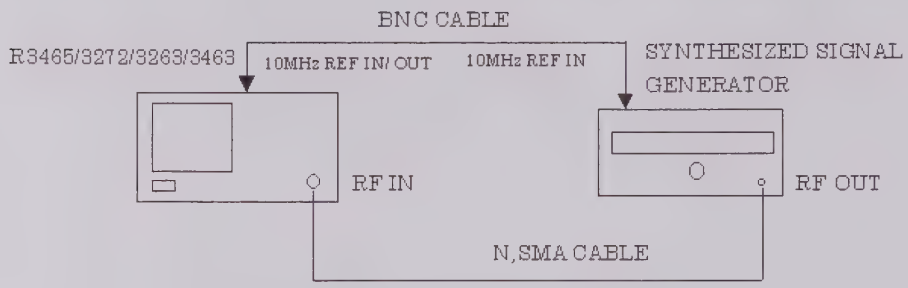

Figure 3-3 Noise Sidebands Test Setup

PROCEDURE

1. Connect the equipment as shown in Figure 3-3.

2. Set the signal Generator (SG2) controls as follows:
   Frequency . . . . . 1.5GHz & 3.5GHz
   CW Output . . . . . -5dBm

3. Press the SHIFT and PRESET keys on the R3465/3272/3263/3463.
   Press FREQ, 1,.,5 and GHz keys.
   Since measurement is made for each of 10kHz and 100kHz offset frequency, set the Span frequency to 2.5 times each offset frequency, or 25kHz and 250kHz.Keep other settings unchanged.

4. Operates keys on the R3465/3272/3263/3463 as follows to measure noise sidebands of each offset frequency. The measurement procedure for 100kHz offset frequency is explained here, and the procedure is applicable for 10kHz offset frequency.
   Set the Span corresponding to offset.
   Press the → RL key.
   Press the CW, *more 1/2*, *NOISE/XHz* and *dBc/Hz* keys.
   Press 1, 0, 0 and kHz keys set to each offset frequency.
   Press the reference level by 20dB and perform averaging for about 20 samples.
   After averaging, read the marker level and write it down in Table 3-6.
   For the R3465/3272, measure noise sidebands with the center frequency at 3.5GHz, and table 3-6 is completed.

Table 3-6 Noise Sidebands

Offset (kHz)	CF 1.5GHz		CF3.5GHz	
	Actual (dBc/Hz)	Max. (dBc/Hz)	Actual (dBc/Hz)	Max. (dBc/Hz)
10		-100		-98
100		-110		-108

3.4.4 Frequency Span Accuracy

DESCRIPTION

Set the signal frequency twice with the synthesized sweeper and measure the difference between signal frequencies with the analyzer.
Check the Span Accuracy using the signal frequency difference measured with the Delta MARKER function.

SPECIFICATION

< ± 4% of actual frequency separation (SPAN > 5MHz)
< ± 1% of actual frequency separation (SPAN ≤ 5MHz)

RELATED ADJUSTMENT

Span adjustment.

EQUIPMENT

Synthesized Sweeper(SG3)
Cables:
SMA, 70cm
BNC, 150cm

SETUP

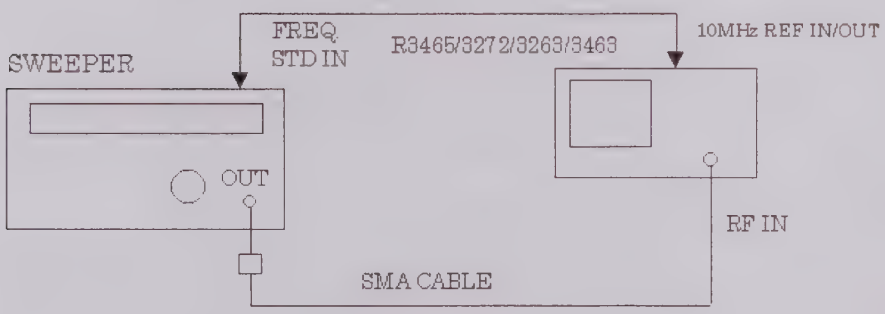

Figure 3-4 Frequency Span Accuracy Test Setup

PROCEDURE

1. Connect the equipment as shown in Figure 3-4.

2. Set the SG3 controls as follows:
   CW 1.498GHz
   Power Level..... -5dBm
   Frequency STD Switch (Rear Panel) .. EXT

3. On the R3465/3272/3263/3463, press the SHIHT, PRESET key and set the R3465/3272/3263/3463 controls as follows:
   Center Frequency 1.5GHz
   Span..... 5MHz

4. On the R3465/3272/3263/3463,press the SINGLE, SRCH,MARKER ON and *Delta MKR* keys.

5. Set the SG3 controls as follows:
   CW 1.502GHz

6. On the R3465/3272/3263/3463, press the SINGLE and SRCH keys. Record the Δ MARKER frequency reading as the actual ?MARKER Reading in table 3-7. The reading should be within the limits shown.

7. On the R3465/3272/3263/3463,press the MARKER ON and *Normal MKR* keys.

8. Set the frequency of SG3, the center frequency and span of the R3465/3272/3263/3463, as shown in Table 3-7,and repeat steps (5) through (8).

Table 3-7 Frequency Span Accuracy

SG3 1st Frequency	SG3 2nd Frequency	R3465/3272/3263/3463		Δ Marker Reading		
		Center Frequency	Span Setting	Min.	Actual	Max.
1.498GHz	1.502GHz	1.5GHz	5MHz	3.96MHz		4.04MHz
1.498GHz	1.502GHz	1.5GHz	5.01MHz	3.847MHz		4.169MHz
1.498GHz	1.516GHz	1.5GHz	40MHz	30.72MHz		33.28MHz
1.34GHz	1.66GHz	1.5GHz	400MHz	384MHz		416MHz
R3465/3272 ONLY						
2.4GHz	5.6GHz	4.0GHz	4GHz	3.84GHz		4.16GHz
0.8GHz	7.2GHz	4.0GHz	8GHz	7.68GHz		8.32GHz
R3272 ONLY						
6GHz	14GHz	10GHz	10GHz	7.68GHz		8.32GHz
2GHz	18GHz	10GHz	19GHz	15.36GHz		16.64GHz

3.4.5 Resolution Bandwidth Accuracy and Selectivity

DESCRIPTION

This test measures the resolution bandwidth accuracy and selectivity. The 60dB bandwidth is then determined and the results used to calculate the selectivity for each bandwidth.

SPECIFICATION

Range:	300Hz to 3MHz, 5MHz ;1, 3, 10 sequence
Accuracy:	± 20% (Resolution Bandwidth 1kHz to 1MHz)
	± 30% (Resolution Bandwidth 300Hz to 3MHz,5MHz)
Selectivity:	< 15:1(300Hz to 5MHz)
	(Resolution Bandwidth 5MHz 50dB BW/3 dB BW)
	(Resolution Bandwidth 300Hz to 3MHz, 60dB BW/3 dB BW)

RELATED ADJUSTMENT

EQUIPMENT

Adapters : Typed N(m) to BNC(f)

Cable : BNC 10cm

- SETUP

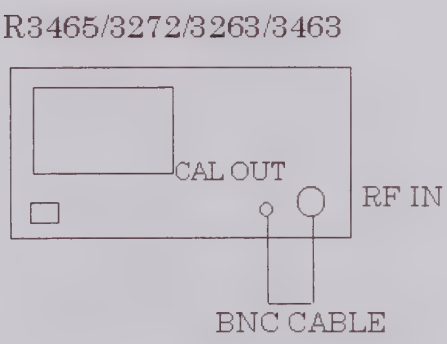

Figure 3-5 Resolution Bandwidth Accuracy / Selectivity Setup

PROCEDURE

[Resolution Bandwidth Accuracy]

1. Connect the R3465/3272/3263/3463 CALOUT to the RF IN as shown in Figure 3-5.

2. Press SHIFT, PRESET keys and set the controls as follows:
   Press FREQ, 3, 0 and MHz keys.
   Press SPAN, 1, 5 and MHz keys.

Press LEVEL, 5, -dBm, *dB/div* and *1dB/DIV* keys.
Press BW, *RBW AUTO MNL*, 5 and MHz keys.
Press FORMAT, *Trace Detector* and *Posi* keys.

3. Press SINGLE key, and wait for a new sweep to finish.

4. Press SRCH, MARKER ON, *more 1/3*, *XdB DOWN*, 3 and dB keys.

5. Record the marker frequency in Tables 3-8 and 3-9 as actual 3dB bandwidth.

6. Change the RBW and span frequency as shown in Table 3-8, and repeat steps (3), (4) and (5) for remaining RBWs.

[Resolution Bandwidth Selectivity]

7. Press SHIFT, PRESET and set the controls as follows:
Press FREQ, 3, 0 and MHz keys.
Press SPAN, 2, 5 and MHz keys.
Press BW, *RBW AUTO MNL*, 5 and MHz keys.
Press VBW AUTO MNL, 1, 0 and kHz keys.
Press FORMAT, *Trace Detector* and *Posi* keys.

8. Press SINGLE key.

9. Press SRCH, MARKER ON, *more 1/3*, *X dB DOWN*, 5, 0 and dB keys.

10. Record the marker frequency in Table 3-9 as actual 60dB bandwidth.

11. Divide the 60dB bandwidth by the 3dB bandwidth and record as the Actual Resolution Bandwidth Selectivity in Table 3-9.

12. Change the RBW and span frequency as shown in Table 3-9, and repeat steps (8) through (11) for remaining RBWs.

Set VBW to AUTO if RBW is 10kHz or below.

Table 3-8 Resolution Bandwidth Accuracy

Resolution Bandwidth Setting	Frequency Span Setting	3dB Bandwidth		
		Min.	Actual	Max.
5MHz	10MHz	3.50MHz		6.5MHz
3MHz	5MHz	2.1MHz		3.9MHz
1MHz	2MHz	800kHz		1.2MHz
300kHz	500kHz	240kHz		360kHz
100kHz	200kHz	80kHz		120kHz
30kHz	50kHz	24kHz		36kHz
10kHz	20kHz	8.0kHz		12.0kHz
3kHz	5kHz	2.4kHz		3.6kHz
1kHz	2kHz	800Hz		1200Hz
300Hz	2kHz	210Hz		390Hz

Table 3-9 Resolution Bandwidth Selectivity

Resolution Bandwidth Setting	Frequency Span Setting	60dB Bandwidth	3dB Bandwidth	Selectivity	
				Actual	Max.
*1) 5MHz	25MHz				15
3MHz	25MHz				15
1MHz	20MHz				15
300kHz	5MHz				15
100kHz	1MHz				15
30kHz	500kHz				15
10kHz	200kHz				15
3kHz	50kHz				15
1kHz	20kHz				15
300Hz	5kHz				15

*1: RBW 5MHz Selectivity = 50dB/3dB

3.4.6 Resolution Bandwidth Switching Uncertainty

DESCRIPTION

This test utilizes the CALOUT signal for measuring the switching uncertainty between RBWs. At each RBW setting, the displayed amplitude variation of the signal in measured. All measurements are referenced to the 300kHz bandwidth.

SPECIFICATION

300Hz to 3MHz RBW: $< \pm 0.3$dB (referred to 300kHz RBW)

RELATED ADJUSTMENT

Nil.

EQUIPMENT

Adapters : Typed N(m) to BNC(f)
Cable : BNC 10cm

SETUP

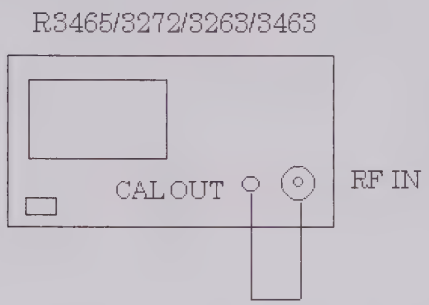

Figure 3-6 Resolution Bandwidth Switching Uncertainty Test Setup

PROCEDURE

1. Connect the R3465/3272/3263/3463 CALOUT to the RF IN as shown in Figure 3-6.

2. Press the SHIFT, PRESET,CAL 7, *EACH ITEM* and *RBW SWITCH* keys.
   Wait for the "Calibration in progress " message to disappear.
   Set the instrument controls as follows:
   Center Frequency 30MHz
   Span. 500kHz
   Ref level . . . . . .-5dBm
   RBW 300kHz
   Sweep Mode . . . . . .SINGLE
   dB/Div 1dB/Div
   Trace Detector . . . . . .Posi

3. Press the SINGLE, SRCH, ON, *Delta Marker* and *FIXED MKR ON OFF* keys to set the MKR to ON.

4. Set the frequency span and RBW to the values listed in the second entry of Table 3-10 (Span 5MHz, RBW,3MHz)

5. Press the SINGLE,SRCH KEYS.
   Record the Δ MARKER amplitude in the Actual Δ MARKER reading column of Table 3-10.The MARKER reading should be within the limit shown.

6. Repeat steps (4) and (5) for each set of frequency span and RBW settings in Table 3-10.

Table 3-10 Resolution Bandwidth Switching Uncertainty

R3465/3272/3263/3463		Δ Marker Reading		
Span	RBW	Min. (dB)	Actual	Max. (dB)
500kHz	300kHz	0	0 (Ref.)	0
5MHz	3MHz	-0.3		+0.3
2MHz	1MHz	-0.3		+0.3
200kHz	100kHz	-0.3		+0.3
50kHz	30kHz	-0.3		+0.3
20kHz	10kHz	-0.3		+0.3
5kHz	3kHz	-0.3		+0.3
2kHz	1kHz	-0.3		+0.3
2kHz	300Hz	-0.3		+0.3

3.4.7 Displayed Average Noise level

DESCRIPTION

This test measures the displayed average noise level in all frequency tests. The analyzer's input is terminated at 50Ω. In Band 1,in the frequency range from 9kHz to 3.0GHz, the test first measures the average noise at 10kHz and 100kHz,then at any frequency point in zero span. For the rest of Band1, and for all remaining bands, the test tunes the analyzer frequency across the band, uses the marker to locate the frequency with the highest response, and then reads the average noise in zero span.

SPECIFICATIONS

Displayed Average Noise level :RBW 1kHz,input attenuator 0dB,VBW 1Hz.

R3465

Frequency range	Average Noise Level
10kHz	-70dBm
100kHz	-80dBm
1MHz to 3.0GHz	-{115-1.55 × f(GHz)}dBm
1.7GHz to 8.0GHz	-115dBm

R3272

Frequency range	Average Noise Level
10kHz	-70dBm
100kHz	-80dBm
1MHz to 3.1GHz	-{115-1.55 × f(GHz)}dBm
3.0GHz to 7.5GHz	-110dBm
7.5.0GHz to 15.4GHz	-103dBm
15.2GHz to 23.3GHz	-96dBm
23GHz to 26.5GHz	-90dBm

R3263/3463

Frequency range	Average Noise Level
10kHz	-70dBm
100kHz	-80dBm
1MHz to 3.0GHz	-{115-1.55 × f(GHz)}dBm

RELATED ADJUSTMENT

Frequency response adjustment

EQUIPMENT

50Ω Terminator

SETUP

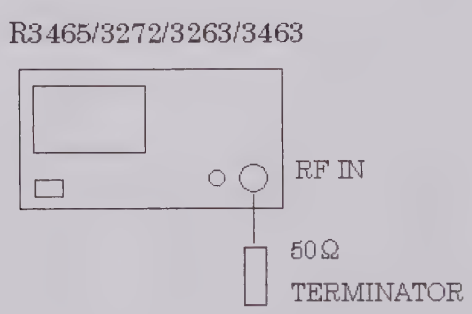

Figure 3-7 Displayed Average Noise Test Setup

PROCEDURE

[Displayed Average Noise, Band 0]

1. Connect the equipment as shown in Figure 3-7.

Press SHIFT, PRESET keys and set the controls as follows:

Center Frequency 10kHz
Span Frequency 0Hz
Reference Level. . . . . -60dBm
RBW 1kHz
VBW 1Hz
Input Attenuator 0dB

2. Press SINGLE key and wait for a new sweep to finish, then press SRCH key.

3. Read the marker level and record it in Table 3-11 as the Displayed Noise Level at 10kHz.

4. Press FREQ,1,0,0 and kHz keys.

5. Press SINGLE key and wait for a new sweep to finish, then press SRCH key.

6. Read the marker level and record it in Table 3-11 as the Displayed Noise Level at 100kHz.

7. For the R3465, press FREQ, *more 1/2* and *Preselector 1.7G 3.0G* keys to set the preselector to 3.0GHz.

8. Change the center frequency to each of the values listed in column 1 of Table 3-11 and repeat step 5 sequentially. Read the marker level and record it in Table 3-11 as the Displayed Noise Level at Center Frequency.

[Displayed Average Noise Level, Band 1 (R3465/3272)]

9. Press SHIFT, PRESET keys and set the controls as follows :
   Start Frequency . . . . . 1.7GHz(3.0GHz for R3272)
   Stop Frequency . . . . . 7.0GHz(7.5GHz for R3272)
   Reference Level. . . . . -40dBm
   RBW 3MHz
   VBW 100kHz
   Input Attenuator 0dB

10. Press FORMAT, *Trace*, *AVG A*, 1, 0, Hz keys and wait for averaging to finish.

11. Press → and *WRITE A* keys.

12. Set the controls as follows :
   Span Frequency 0Hz
   Reference level . . . . . -60dBm
   RBW 1kHz
   VBW 1Hz

13. Press SINGLE and SRCH keys.

14. Read the marker level and record it in Table 3-11 as the Displayed Average Noise Level from 1.7GHz (3.0GHz for R3272) to 7.0GHz (7.5GHz for R3272).

[Displayed Average Noise Level, Band 2(R3465/3272)]

15. Press SHIFT, PRESET and set the controls as follows:
    Start Frequency . . . . . 6.9GHz (7.4GHz for R3272)
    Stop Frequency . . . . . 8.0GHz(15.4GHz for R3272)
    Reference Level. . . . . -40dBm
    RBW 3MHz
    VBW 100kHz
    Input Attenuator 0dB

16. Repeat steps (10) through (13).

17. Read the marker level and record it in Table 3-11 as the Displayed Noise Level from 6.9GHz (7.4GHz for R3272) to 8.0GHz(15.4GHz for R3272).

[Displayed Average Noise, Band 3(R3272 only)]

18. Press SHIFT,PRESET and set the controls as follows :
    Start Frequency 15.201GHz
    Stop Frequency 23.3GHz
    Reference Level. . . . . -40dBm
    RBW 3MHz
    VBW 100kHz
    Input Attenuator 0dB

19. Repeat steps (10) through (13).

20. Read the marker level and record it in Table 3-11 as the Displayed Average Noise Level from 15.2GHz to 23.3GHz.

[Displayed Average Noise, Band 4(R3272 only)]

21. Press SHIFT, PRESET and set the controls as follows:
    Start Frequency 23.001GHz
    Stop Frequency 26.5GHz
    Reference Level. . . . . -40dBm
    RBW 3MHz
    VBW 100kHz
    Input Attenuator 0dB

22. Repeat steps (10) through (13).

23. Read the marker level and record it in Table 3-11 as the Displayed Average Noise Level from 23GHz to 26.5GHz.

Table 3-11 Dsplayed Average Noise Level(R3465)

Frequency	Displayed Average Noise Level (dBm)	Specification (dBm)
10kHz		-70.0
100kHz		-80.0
1MHz		-114.99
100MHz		-114.84
500MHz		-114.22
1000MHz		-113.45
1500MHz		-112.67
2000MHz		-111.90
2500MHz		-111.12
3000MHz		-110.35
1.7GHz to 7.0GHz		-115.0
6.9GHz to 8GHz		-115.0

Table 3-11 Displayed Average Noise level(R3272)

Frequency	Displayed Average Noise Level (dBm)	Specification (dBm)
10kHz		-70.0
100kHz		-80.0
1MHz		-114.99
100MHz		-114.84
500MHz		-114.22
1000MHz		-113.45
1500MHz		-112.67
2000MHz		-111.90
2500MHz		-111.12
3000MHz		-110.35
3.0GHz to 7.5GHz		-110.0
7.4GHz to 15.4GHz		-103.0
15.2GHz to 23.3GHz		-96.0
23GHz to 26.5GHz		-90.0

Table 3-11 Displayed Average Noise level(R3263/3463)

Frequency	Displayed Average Noise Level (dBm)	Specification (dBm)
10kHz		-70.0
100kHz		-80.0
1MHz		-114.99
100MHz		-114.84
500MHz		-114.22
1000MHz		-113.45
1500MHz		-112.67
2000MHz		-111.90
2500MHz		-111.12
3000MHz		-110.35

3.4.8 Gain Compression

DESCRIPTION

This test measures gain compression in the low and high bands:
Two signals, separated by 1MHz, are used. First a -30dBm signal is placed at the input of the R3465/3272/3263/3463.
After that, input a signal at -5dBm or above and increase its signal level. The initial-signal level at -30dBm is lowered. Measure the input level when the signal is lowered by 1dB.

SPECIFICATION

-5dBm (mixer level) > 10MHz

RELATED ADJUSTMENT

Nil.

EQUIPMENT

Synthesized Sweeper(SG1)
Synthesized Signal Generator(SG2)
Power Meter
Power Sensor(Sensor1)
Power Splitter
20dB Pad
3dB Pad
Cable: SMA (Three required)

SETUP

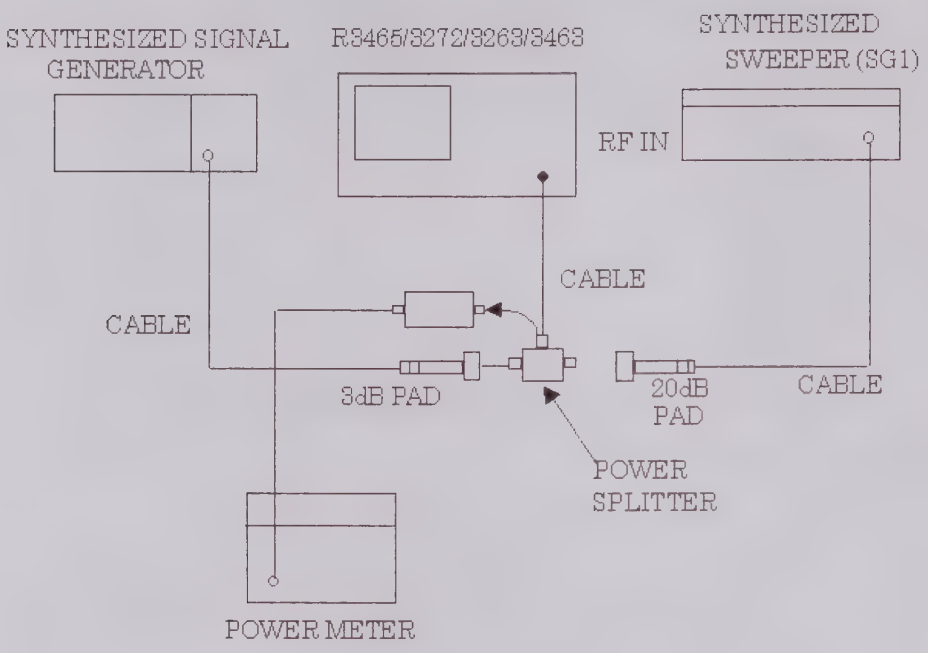

Figure 3-8 Gain Compression Test Setup

PROCEDURE

1. Zero and calibrate the Power Meter.

2. Connect the equipment as shown in Figure 3-8.

3. Press the INSTR PRESET by on both the SG1 and SG2.
   Set the controls for the SG2 as follows:
   CW 821MHz
   Power Level. . . . . -2dBm

4. Set the controls for the SG1 as follows:
   CW 820MHz
   Power Level. . . . . -4dBm

5. On the R3465/3272/3263/3463, press the SHIFT and PRESET keys.
   Set the R3465/3272/3263/3463 controls as follows:
   Center Frequency 820.5MHz
   Span. 2MHz
   ATT 0dB
   dB/div 1dB/div

6. On the R3465/3272/3263/3463, press the LEVEL, 3, 0, and -dBm keys.

7. On the SG2, set the output to OFF.

8. Adjust the power level of SG1 for a displayed signal level of -30dBm ± 0.1dB on the R3465/3272/3263/3463 screen.

9. On the SG2, set the output to ON.

10. Turn the power level knob on the SG2 until the signal level at 2.5div. in the left-hand part on the R3465/3272/3263/3463 screen is lowered by 1dB from -30dBm.If the power level knob cannot be turned any more, stop it there.

11. Remove the SMA cable from the input terminal of the R3465/3272/3263 and connect the power sensor there.

12. Record the amplitude reading on the Power Meter.
    It should be greater than -5dBm _____dBm
    The following steps are to be performed for the R3465 and R3272.

13. Rotate the CAL FACTOR switch to the Power Sensor's 3.2GHz calibration factor.
    On the SG2,set the output to OFF.

14. Set the SG2 controls as follows :
    CW 3.201GHz
    Power Level..... -2dBm

15. Set the SG1 controls as follows :
    CW 3.2GHz

16. Set the R3465/3272 controls as follows :
    Center Freq 3.2005GHz
    Span..... 2MHz
    Ref level ..... -10dBm
    dB/div 10dB

17. On the R3465/3272, press FREQ key, *more 1/2*, *PRESELE*, and *AUTO PEAKING* keys.
    Wait for the "peaking!!" message to disappear.
    Set the dB/div to 1dB/div.

18. Repeat the (6) through (11).

19. Record the amplitude reading on the Power Meter.
    It should be greater than -5dBm.
    _____dBm

Table 3-12 Gain Compression

R3465/3272/3263/3463 Center Freq(MHz)	SG1 CW (MHz)	SG2 CW (MHz)	1dB Gain Compression level(dBm)
820.5 3200.5	820 3200	821 3201	

3.4.9 Residual Response

DESCRIPTION

This test checks for residual responses. Any response located above the display line is measured in a narrow frequency span and RBW. The RF INPUT is terminated in 50 Ω.

SPECIFICATION

R3465 . . . . . 1MHz to 3.0GHz < -100dBm
300kHz to 8GHz < -90dBm
(with no signal at input and 0dB input attenuator.
RF INPUT is terminated in 50 Ω.)
R3272 . . . . . 1MHz to 3.0GHz < -100dBm
300kHz to 26.5GHz < -90dBm
R3263/3463. . . . . 1MHz to 3.0GHz < -100dBm
300kHz to 3.0GHz < -90dBm

RELATED ADJUSTMENT

There is no related adjustment for this performance test.

EQUIPMENT

Coaxial 50 Ω termination
Adapters:
Type N to SMA
Type N to BNC
Cable:
BNC, 150cm

SETUP

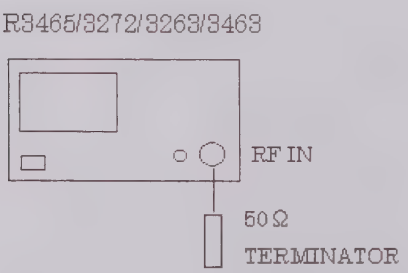

Figure 3-9 Residual Response Test Setup

PROCEDURE

1. Install the Type N to SMA adapter and 50 Ω termination on the RF INPUT. Press the SHIFT,PRESET key and set the controls as follows:

   Center frequency 1.3MHz

Span 2MHz
CF Step 1.9MHz
Ref Level . . . . . -50dBm
ATT 0dB
RBW 10kHz
VBW 300Hz

2. For the R3465, press the FREQ, *more 1/2* and *Preselecetor 1.7G 3.0G* to set the preselector to 3.0GHz.

3. Press the FORMAT, *DSP LINE ON OFF* , 1, 0, 0 and -dBm keys.
Press the SINGLE key.

   The noise level should be at least 3dB below the display line. If it is not, it will be necessary to reduce the Span and RBW to reduce the noise level. If the span is reduced, reduce the CS Step to no more than 95% of the Span.

4. If a residual is suspected, press the SINGLE key again. A residual response will persist, but a noise peak will not. Record the frequency and amplitude of any responses above the display line.

5. If a response is marginal, verify the response amplitude as follows :

   ① Press the REPEAT key.
   ② Place the marker on the peak of the response in the question.
   ③ Press the → CF key.
   ④ Press the BW and *RBW AUTO MNL* keys to set the RBW to AUTO.
   ⑤ Continue to reduce the Span until a RBW of 300Hz is reached.
   Press the → CF key.
   ⑥ Record the frequency and amplitude of any residual response above the display line.

6. Check for residuals up to 3GHz using the procedure of step (3) through (5) above. To change the center frequency, then press the FREQ and D keys.
<<Residual Response, 1.7GHz (3.0GHz for R3272) to 8.0GHz (26.5GHz for R3272) Band>>

7. Set the R3465/3272 as follows :
   Center Frequency 1.725GHz
   (3.025GHz for R3272)
   Span 50MHz
   CF Step 47.5MHz
   RBW 300kHz
   VBW 300Hz
   Press the *DSP LINE ON/OFF*, 9, 0, -dBm keys.

8. For the R3465, press FREQ, *more 1/2* and *Preselector 1.7G 3.0G* to set the preselector to 1.7GHz.

9. Check for residuals up to center frequency 7.975GHz (26.475GHz for the R3272) using the procedure of steps (3) through (5) above. To change the center frequency, then press the FREQ and D keys.

3.4.10 Second Harmonic Distortion

DESCRIPTION

A synthesized sweeper and low-pass filter provide the signal for measuring second harmonic distortion. The low-pass filter eliminates any harmonic distortion originating at the signal source. The R3465/3272/3263/3463 frequency response is calibrated. The synthesized sweeper is phase-locked to the spectrum analyzer's 10MHz reference.

SPECIFICATION

R3465 : -70dBc(10MHz to 3.0GHz,-30dBm mixer level.)
-90dBc(> 1.7GHz,-10dBm mixer level)
R3272 : -70dBc(10MHz to 3.0GHz,-30dBm mixer level.)
-100dBc(> 3.0GHz,-10dBm mixer level)
R3262/3463: -70dBc(10MHz to 3.0GHz,-30dBm mixer level.)

RELATED ADJUSTMENT

There is no related adjustment procedure for the performance test.

EQUIPMENT

Synthesized Sweeper(SG1)
Power Meter
Power Sensor
Power Splitter
2GHz Low-pass filter
Adapter:
Type N to SMA
Cables:
BNC,150cm
SMA, 70cm

SETUP

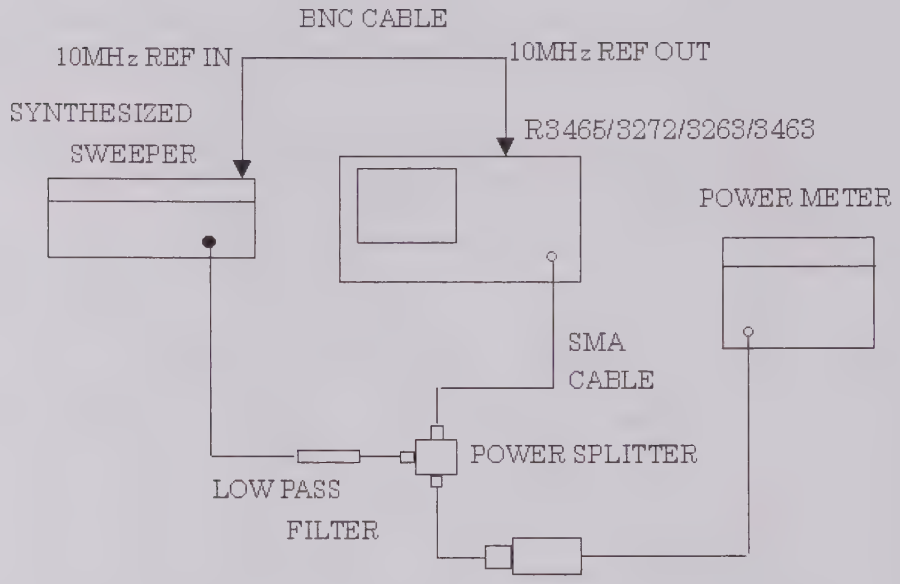

Figure 3-10 Second Harmonic Distortion Test Setup

PROCEDURE

[9kHz to 3.0GHz Band]

1. Zero and calibrate the Power Meter. Rotate the CAL FACTOR switch to the Power Sensor's 1.4GHz calibration factor.

2. Connect the equipment as shown in Figure 3-10.

3. Press the INSTR PRESET key on the SG1. Set the SG1 controls as follows:
   CW 1.4GHz
   Power Level 0dBm
   Frequency Standard Switch(rear panel) .... EXT 10MHz

4. On the R3465/3272/3263/3463,press SHIFT,PRESET keys and set the controls as follows:
   Center Frequency 1.4GHz
   Span 10kHz
   VBW 30Hz
   ATT 20dB
   Ref Level ..... -10dBm

5. Set the SG1 POWER LEVEL key for a -10dBm ± 0.1dB reading on the Power Meter.

6. For the R3465, press FREQ, *more 1/2* and *Preselector 1.7G 3.0G* to set the preselector to 3.0GHz.

7. On the R3465/3272/3263/3463, press SINGLE,SRCH,MARKER ON, *Delta MKR*, *more 1/3* and *FIXED MKR ON OFF* keys to set the FIXED MARKER to ON.

8. On the R3465/3272/3263/3463, press FREQ, 2,.,8, GHz and SINGLE keys.
   Wait for completion of the sweep.
   Press SRCH and record the Δ MKR amplitude.
   It should be less than -70dBc.
   Second Harmonic Distortion(< 3.0GHz) _____dBc

[> 1.7GHz (3.0GHz for R3272) Band (R3465/3272)]

9. On the R3465/3272, press SHIFT,PRESET keys and set the controls as follows :
   Center frequency 3.8GHz
   Span. 500kHz

10. Set the SG1 controls as follows :
    CW 3.8GHz
    Power Level. . . . . .-10dBm

11. On the R3465/3272, press FREQ, *more 1/2*, *PRESELE*, and *AUTO PEAKING* keys. Wait for the peaking message to disappear.

12. Set the SG1 controls as follows :
    CW 1.9GHz
    Power Level. 0dBm

13. Connect the equipment as shown in Figure 3-10.

14. Rotate the CAL FACTOR switch to the Power Sensor's 1.9GHz calibration factor.

15. Set the SG1 POWER LEVEL key for a 0dBm ± 0.1dB reading on the Power Meter.

16. (On the R3465/3272, press FREQ ,1,.,9 and GHz keys.
    Press SPAN, 5 and kHz keys.
    Press SRCH,MARKER ON, *Delta MKR* and *FIXED MKR ON OFF* to set the FIXED MKR to ON.
    On the R3465/3272, press FREQ, 3,., 8, and GHz keys.
    Press LEVEL, 4, 0 and -dBm keys.
    Press FORMAT, *Trace*, *AVG A*, 1, 0, and Hz keys.
    Wait for the end of 10 averagings.
    Press SRCH and record the Δ MKR amplitude.
    It should be less than -100dBc.
    Second Harmonic Distortion (> 1.7GHz (3.0GHz for R3272))
    _____dBc

3.4.11 Third Order Intermodulation Distortion

DESCRIPTION

Two Synthesized sweepers provide the signals required for measuring third order intermodulation.
It is difficult when the input level is low because of being buried to the noise, to measure the spectrum generated by the distortion. Third order intermodulation is distortion raised by 20dB if the input level is raised by 10dB.
Then, examine with mixer input level set in -20dBm after the spec is converted into a value which is 20dB larger.

SPECIFICATION

For a total mixer input level* of -30dBm :

R3465	:	10MHz to 3.0GHz : < -75dBc
		1.7GHz to 8GHz : < -75dBc
R3272	:	10MHz to 3.0GHz : < -75dBc
		3.0GHz to 26.5GHz : < -75dBc
R3263/3463	:	10MHz to 3.0GHz : -75dBc

Total mixer input level = Total input level - Input Attenuation

Converted Specification for a total mixer input level* of -20dBm :

R3465	:	10MHz to 3.0GHz : < -55dBc
		1.7GHz to 8GHz : < -55dBc
R3272	:	10MHz to 3.0GHz : < -55dBc
		3.0GHz to 26.5GHz : < -55dBc
R3263/3463	:	0MHz to 3.0GHz : -55dBc

Related Adjustment

Nil.

EQUIPMENT

Synthesized Sweeper (SG1)
Synthesized Sweeper (SG2)
Power Driver #1 (Divider1)
Power Driver #2 (Divider2)
Cables: SMA 70cm(Three required)

SETUP

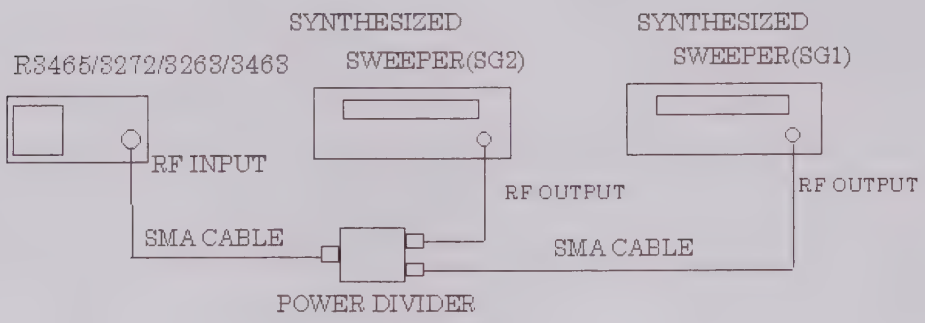

Figure 3-11 Third Order Intermodulation(< 2GHz) Test Setup

PROCEDURE

The following procedure carry out at -20dBm for a total mixer input level.

[Third order intermodulation(< 2GHz)]

1. Select Driver 1 and connect the units as shown in Figure 3-11.

2. Press the INSTR PRESET key on each synthesized sweeper. Set each of the synthesized sweeper controls as follows:
   Power Level. . . . . .-10dBm
   CW(SG1). 820.0125MHz
   CW(SG2). 820.000MHz
   Rf Output. . . . . .OFF

3. On the R3465, 3272, 3263/3463, press the SHIFT and PRESET keys. Set the R3465/3272/3263/3463 controls as follows:
   Center Frequency 820.005MHz
   Ref Level. . . . . .-10dBm
   Freq Span. 50kHz
   RBW 300Hz
   VBW 300Hz
   ATT 10dB

4. On the SG1, set the output to ON.

5. On the 3465/3272/3263/3463, press the MARKER ON, *Peak* and *CONT Peak ON OFF* to set the CONT Peak to ON.

6. On the SG1, adjust the POWER LEVEL key for a -10dBm ± 0.1dB reading on the R3465/3272/3263/3463 display.

7. On the SG1, set the output to OFF. On the SG2, set the output to ON.

8. On the SG2, adjust the POWER LEVEL key for a -10dBm ± 0.1dB reading on the R3465, 3272, 3263/3463 display.

9. On the SG1,set the output to ON.

10. On the R3465/3272/3263/3463,press the following keys : *CONT Peak OFF* to set the CONT Peak to OFF and the SINGLE keys.
    Wait for a new sweep to finish.
    Press the SRCH, MKR ON and Delta MKR keys.

11. Third order intermodulation distortions appear symmetrically 12.5kHz apart from the two carries.Move MKR to each distorted position with the knob or Δ key, read the level in dBc and record the greater reading.

[Third order intermodulation, 3.2GHz (R3465/3272)]

12. Change Divider 1 to 2.

13. Press the INSTR PRESET key on each synthesized sweeper. Set each of the synthesized sweeper controls as follows :
    Power Level. . . . . .-10dBm
    CW(SG1). 3.2000125GHz
    CW(SG2). 3.2GHz
    RF Output . . . . . .OFF

14. On the R3465/3272, press the SHIFT and PRESET keys. Set the R3465/3272 controls as follows :
    Center Frequency 3.200005MHz
    Ref Level. . . . . .-10dBm
    Span. 50kHz
    RBW 300Hz
    ATT 10dB
    VBW 300Hz

15. Repeat steps (4) to (11) to measure the third order intermodulation distortions and record the greater reading.

Table 3-13 Third Order Intermodulation Distortion

SG1 [CW] (MHz)	SG2 [CW] (MHz)	Third Order Iitermodulation Distortion	
		Auctual (dBc)	Max (dBc)
820.0125	820		-55
3200.0125	3200		-55

3.4.12 Image, Multiple and Out-of-Band Response

DESCRIPTION

The performance tests in the R3465,R3272 and R3263/3463 differ in measurement frequency. Make measurement with each band.

SPECIFICATION

Image, Multiple and Out-of-Band Response :
R3465 : -70dBc(10MHz to 8GHz)
R3272 : -70dBc(10MHz to 18GHz)
-60dBc(10MHz to 23GHz)
-50dBc(10MHz to 26.5GHz)
Image and Multiple Response:
R3263/3463: -70dBc(10MHz to 3GHz)

RELATED ADJUSTMENT

YTF adjustment

EQUIPMENT

Synthesized Sweeper(SG3)
Power Meter
Power Sensor (Sensor1)
Power Splitter
Adapter : Type N to SMA
Cable : SMA,70cm

SETUP

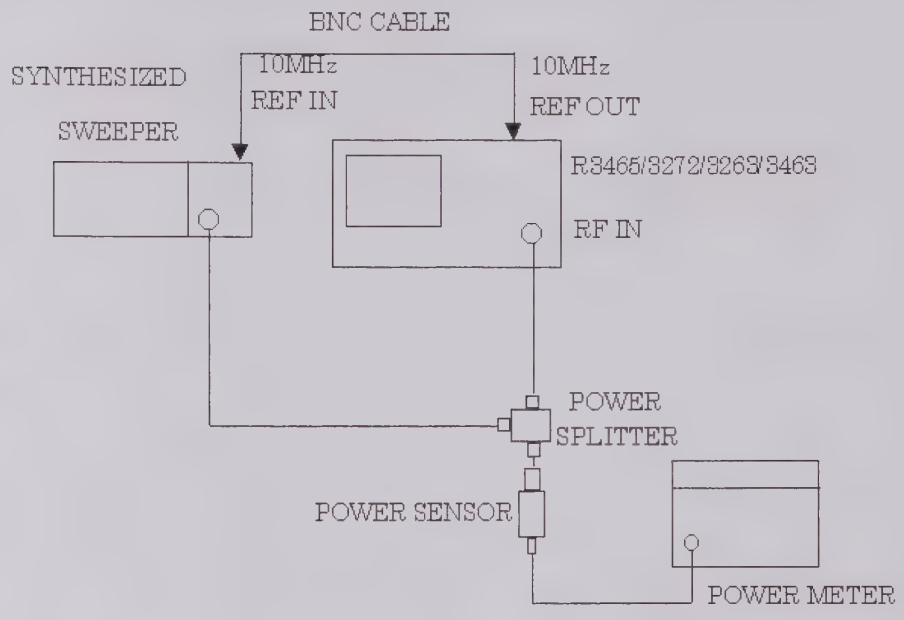

Figure 3-12 Image, Multiple and out-of-Band Response Test Setup

PROCEDURE

[9kHz to 3GHz Band (R3465/3272/3263/3463)]

1. Connect the equipment as shown in Figure 3-12,but do not connect the Power Sensor.

2. Press the INSTR PRESET key on the SG3 and set the controls as follows :
   CW 2GHz
   Power Level.....0dBm

3. On the R3465/3272/3263/3463, press the SHIFT, PRESET keys and set the controls as follows:
   Center Frequency 2GHz
   Span.....40MHz
   RBW 100kHz
   VBW 300kHz

4. Zero and calibrate the Power Meter. Rotate the CAL FACTOR switch to the Power Sensor's 2GHz calibration factor.
   Connect the Power Sensor to the Power Splitter.

5. Adjust the SG3 POWER LEVEL key for a 0dBm ± 0.1dB reading on the Power Meter.

6. For the R3465, press FREQ, *more 1/2* and *Preselector 1.7G 3.0G* to set the pre-selector to 3.0GHz.

7. On the R3465/3272/3263/3463, press SPAN, 5,MHz, SINGLE, SRCH, MARKER ON, *Delta MKR* and *FIXED MKR ON OFF* to set the FIXED MKR to ON.

8. For each of the frequencies listed in Table 3-14, 3-15 and 3-16 (Table 3-14:R3272, Table 3-15:R3465, Table 3-16: R3263/3463) for the 9kHz to 3.1GHz band, do the following:

   ① Set the SG3 to the listed CW key frequency.

   ② On the Power Meter, rotate the CAL FACTOR switch to the appropriate Power Sensor calibration factor.

   ③ Set the SG3 POWER LEVEL key for a 0dBm reading on the Power Meter.

   ④ Press SINGLE key on the R3465/3272/3263/3463.

   ⑤ On the R3465/3272/3263/3463, press SRCH key and record the D MKR amplitude in Table 3-14, 3-15 and 3-16 as the response amplitude. The response amplitude should be less than the specification listed in the table.

9. On the R3465/3272/3263/3463, press the MARKER ON, *MKR OFF* and REPEAT keys.
   Measurement frequency for the R3465 is different for the following bands. Therefore, skip steps (10) to (28) and restart from step (29). The following steps are for the R3272.

[3.0 to 7.5GHz Band (R3272 only)]

10. On the R3272, press FREQ, 5,., 5 and GHz keys. Set the SG3 CW to 5.5GHz.

11. Rotate the CAL FACTOR switch to the Power Sensor's 5.5GHz calibration factor on the Power Meter.

12. On the SG3, set the power level to the Power Meter indicate 0dBm.
    On the R3272, press SPAN, 5, MHz, SRCH,FREQ, *more 1/2*, *PRESELE* and *AUTO PEAKING* keys. Wait for the "peaking!!" message to disappear.
    Press SINGLE, SRCH,MARKER ON, *Delta MKR* and *FIXED MKR ON OFF* to set the FIXED MKR to ON.

13. Reapeat steps (8) and (9) for the SG3 frequencies listed in Table 3-14 for the 3.0GHz to 7.5GHz band.

[7.4GHz to 15.4GHz Band (R3272 only)]

14. On the R3272, press the FREQ, 1, 2, and GHz keys. Set the SG3 CW to 12GHz.

15. Rotate the CAL FACTOR switch to the Power Sensor's 12GHz calibration factor on the Power Meter.

16. Repeat step (12) for the R3272.

17. Repeat step (8) and (9) for the SG3 frequencies listed in Table 3-14 for the 7.4GHz to 15.4GHz band.

[15.2GHz to 23.3GHz Band (R3272 only)]

18. On the R3272, press the FREQ, 2, 1, and GHz keys. Set the SG3 CW to 21GHz.

19. Rotate the CAL FACTOR switch to the Power Sensor's 21GHz calibration factor on the Power Meter .

20. Repeat step (12) for the R3272.

21. Repeat steps (8) and (9) for the sweeper frequencies listed in Table 3-14 for the 15.2 to 23.3GHz band.

[23 to 26.5GHz band (R3272 only)]

22. On the R3272, press the FREQ, 2, 4, ., 4 and GHz keys. Set the SG3 CW to 24.4GHz.

23. Rotate the CAL FACTOR switch to the Power Sensor's 24.4GHz calibration factor on the Power Meter.

24. Repeat step (12) for the R3272.

25. Repeat steps (8) and (9) for the SG3 frequencies listed in Table 3-14 for the 23 to 26.5GHz band.

26. Record the maximum response amplitude from Table 3-14.
(At frequency less than 18GHz)
Maximum Response Amplitude(< 18GHz) _____dBc

27. Record the maximum response amplitude from Table 3-14.
(At frequency ranging from 18 to 23GHz)
Maximum Response Amplitude(< 23GHz) _____dBc

28. Record the maximum response amplitude from Table 3-14.
(At frequency ranging from 23 to 26GHz)
Maximum Response Amplitude(< 26.5GHz) _____dBc
The following steps are for the R3465.

[1.7 to 8GHz Band (R3465 only)]

29. Press FREQ, *more 1/2* and *Preselector 1.7G 3.0G* key to set the preselector to 1.7GHz.

30. On the R3465, press FREQ, 6, and GHz keys. Set the SG3 CW to 6GHz.

31. Rotate the CAL FACTOR switch to the Power Sensor's 6GHz calibration factor on the Power Meter.

32. On the SG3, set the power level to the Power Meter indicate 0dBm.
On the R3465, press SPAN, 5, MHz, SRCH, FREQ, *more 1/2* and *AUTO PEAKING* keys. Wait for the "peaking!!" message to disappear.
Press SINGLE, SRCH, MARKER ON, *Delta MKR* and *FIXED MKR ON OFF* keys to set the FIXED MKR to ON.

33. Repeat steps (8) and (9) for the SG3 frequency listed in Table 3-15 for the 1.7 to 8GHz band's 6GHz center frequency.

34. On the R3465,press FREQ, 8 and GHz keys. Set the SG3 CW to 8GHz.

35. Rotate the CAL FACTOR switch to the Power Sensor's 8GHz calibration factor on the Power Meter.

36. Repeat step (32) for the R3465.

37. Repeat steps (8) and (9) for the SG3 frequencies listed in Table 3-15 for the 1.7 to 8GHz band's 8GHz center frequency.

38. Record the maximum response amplitude from Table 3-15.
Maximum Response Amplitude _____dBc

Table 3-14 Image, Multiple and Out-of-Band Responses (R3272)

Band	R3272 Center Freq. (GHz)	SG CW (MHz)	Response Amplitude (dBc)	Specification (dBc)
9kHz to 3.1GHz Band	2.0	1957.2		-70
	2.0	1157.2		-70
	2.0	10462.8		-70
	2.0	8231.4		-70
3.0GHz to 7.5GHz Band	5.5	6342.8		-70
	5.5	11421.4		-70
	5.5	17342.8		-70
	5.5	23264.2		-50
7.4GHz to 15.4GHz Band	12.0	12842.8		-70
	12.0	5789.3		-70
	12.0	18210.7		-60
	12.0	24421.4		-50
15.2GHz to 23.3GHz Band	21.0	21842.8		-60
	21.0	6719.06		-70
	21.0	13859.53		-70
23GHz to 26.5GHz Band	24.4	25242.8		-60
	24.4	5783.95		-70
	24.4	11989.3		-70
	24.4	18194.65		-60

Table 3-15 Image,Multiple and Out-of-Band Responses (R3465)

Band	R3465 Center Freq. (GHz)	SG CW (MHz)	Response Amplitude (dBc)	Specification (dBc)
9kHz to 3.0GHz Band	2.0	1957.2		-70
	2.0	1157.2		-70
	2.0	10462.8		-70
	2.0	8231.4		-70
1.7GHz to 8GHz Band	6.0	6842.8		-70
	8.0	4632.1		-70
	8.0	3789.3		-70

Table 3-16 Image and Multiple Responses (R3263/3463)

Band	R3263/3463 Center Freq. (GHz)	SG CW (MHz)	Response Amplitude (dBc)	Specification (dBc)
9kHz to 3.0GHz Band	2.0	1957.2		-70
	2.0	1157.2		-70

3.4.13 Frequency Response

DESCRIPTION

The SG3 signal is fed through a Power Splitter to a Power Sensor and the R3465/3272/3263/3463.The SG3's power level is adjusted at 30MHz to place the displayed signal at the R3465/3272/3263/3463 center horizontal graticule line.The Power Meter is placed in RATIO mode.At each new SG3 frequency, the SG3's power level is adjusted to the center horizontal graticule line.The power meter displays the inverse of the frequency response relative to the calibrator.

SPECIFICATION

R3465 : ± 1.5dB (9kHz to 3.0GHz) (10dB Input Attenuator)
± 1.5dB (50MHz to 3.0GHz)
± 1.5dB (1.7GHz to 7.0GHz)
± 1.5dB (6.9GHz to 8GHz)
R3272 : ± 1.5dB (9kHz to 3.1GHz)
± 1.0dB (50MHz to 3.1GHz)
± 1.5dB (3.0GHz to 7.5GHz)
± 3.5dB (7.4GHz to 15.4GHz)
± 4.0dB (15.4GHz to 23.3GHz)
± 4.0dB (23GHz to 26.5GHz)
R3263/3463 : ± 1.5dB (9kHz to 3.0GHz)
± 1.0dB (50MHz to 3.0GHz)
Frequency response relative to the calibrator (30MHz):
R3465 : ± 3dB (9kHz to 8GHz)
R3272 : ± 5dB (9kHz to 26.5GHz)

R3263/3463 : ± 1.0dB (9kHz to 3GHz)

RELATED ADJUSTMENT

YTF adjustment.
Frequency response adjustment.

EQUIPMENT

Synthesized Sweeper(SG3)
Power Meter
Power Sensor (Sensor 1)
Power splitter
Adapter:
Type N to SMA
SMA (m) to SMA (m)
Cables:
SMA, 70cm (Two required)

SETUP

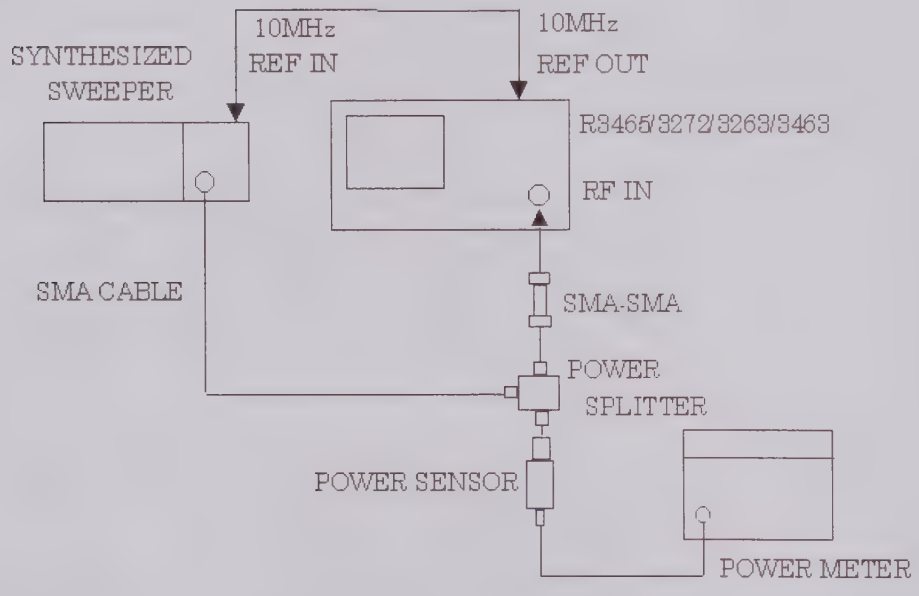

Figure 3-13 Frequency Response Test Setup

PROCEDURE

1. Zero and calibrate the Power Meter.

2. Connect the equipment as shown in Figure 3-13.

3. Press the INSTR PRESET key on the SG3. Set the controls as follows:
   CW 30MHz
   Freq Step 100MHz
   Power Level.....-4dBm

4. On the R3465/3272/3263/3463, press the SHIFT and PRESET keys.
   Center Frequency 30MHz
   CF Step 100MHz
   Span.....5MHz
   Ref Level .....-5dBm
   dB/div 2dB/div
   RBW 300kHz
   VBW 100Hz
   Trace Detector.....Posi

5. Press MARKER ON, *Peak* and *CONT Peak ON OFF* keys to set the CONT PEAK to ON.

6. Adjust the SG3 POWER LEVEL for a MKR amplitude reading of -10dBm ± 0.09dB.

7. Press the dB [REF] switch on the Power Meter.

[Frequency Response (R3465/3272/3263/3463:9kHz to 3.0GHz Band)]

8. Set the SG3 CW to 100MHz.

9. For the R3465, press FREQ, *more 1/2* and *preselector 1.7G 3.0G* to set the preselector to 3.0GHz.

10. On the R3465/3272/3263/3463, press FREQ, 1, 0, 0, and MHz keys.

11. Adjust the SG3 POWER LEVEL for an R3465/3272/3263/3463 MKR amplitude reading of -10dBm ± 0.09dBm.

12. Record the reverse sign value of the power ratio displayed on the Power Meter in Table 3-17.

13. On the SG3, press the CW and up keys.
    On the 3465/3272/3263/3463, press the FREQ and D keys.
    At each new frequency, repeat steps (11) and (12), rotating the CAL FACTOR switch to the Power Sensor's calibration factor.

[Frequency Response (R3465 : 1.7 to 7.0GHz Band) (R3272 : 3.0 to 7.5GHz Band)

14. For the R3465, press FREQ, *more 1/2* and *Preselector 1.7G 3.0G* to set the preselector 1.7GHz.

15. On the R3465/3272, press FREQ, 1, ., 8 and GHz keys.
(3, ., 1 for R3272)

16. Set the SG3 CW to 1.8GHz.(3.1GHz for R3272)

17. On the R3465/3272, press SRCH, FREQ, *more 1/2*, *PRESELE* and *AUTO PEAKING* keys.
Wait for the "peaking!!" message to disappear.

18. Adjust the SG3 POWER LEVEL for an R3465/3272 MKR amplitude reading of -10dBm ± 0.09dB.

19. Record the reverse sign value of the power ratio displayed on the Power Meter in Table 3-18 and 3-19.

20. On the SG3, press the CW and up keys.
On the R3465/3272, press the FREQ and D keys.
At each new frequency, repeat steps (17) through (19), rotating the CAL FACTOR switch to the Power Sensor's calibration factor.

[Frequency Response (R3465 : 6.9 to 8.0GHz Band) (R3272 : 7.4 to 15.4GHz Band)]

21. On the R3465/3272,press FREQ, 7, ., 0 and GHz keys.
(7, .. 5 for R3272)
Press FREQ and *CF STEP AUTO MNL* to set the CF STEP to MNL.
Press 2,0,0 and MHz keys.

22. Set the SG3 CW to 7.0GHz (7.5GHz for R3272) and CF STEP SIZE to 200MHz.

23. On the R3465/3272, press SRCH, FREQ, *more 1/2*, *PRESELE* and *AUTO PEAKING* key. Wait for the "peaking!!" message to disappear.

24. Adjust the SG3 POWER LEVEL for an R3465/3272 MKR amplitude reading -10dBm ± 0.09dB.

25. Recording the reverse sign value of the power ratio displayed on the Power Meter in Table 3-20 and 3-21.

26. On the SG3,press the CW and up keys.
On the R3465/3272, press the FREQ and Δ keys.
At each new frequency, repeat steps (23) through (25), rotating the CAL FACTOR switch to the Power Sensor's calibration factor.

[Frequency Response (R3272: 15.2 to 23.3GHz band)]

27. On the R3272, press FREQ, 1, 5, ., 4 and GHz keys.

28. Set the SG3 CW to 15.4GHz.

29. On the R3272, press SRCH, FREQ, *more 1/2*, *PRESELE* and *AUTO PEAKING* keys. Wait for the "peaking!!" message to disappear.

30. Adjust the SG3 POWER LEVEL for an R3272 MKR amplitude reading of -10dBm ± 0.09dB.

31. Record the negative value of the power ratio displayed on the Power Meter in Table 3-22.

32. On the SG3, press the CW and up keys.
    On the R3272, press the FREQ and Δ keys. At each new frequency, repeat steps (29) through (31), rotating the CAL FACTOR switch to the Power Sensor's calibration factor.

[Frequency Response (R3272 : 23 to 26.5GHz Band)]

33. On the R3272,press FREQ,2,3,.,4 and GHz keys.

34. Set the SG3 CW to 23.4GHz.

35. On the R3272, press SRCH, FREQ, *more 1/2*, *PRESELE* and *AUTO PEAKING* keys. Wait for the "peaking !!" message to disappear.

36. Adjust the sweeper POWER LEVEL for an R3272 MKR amplitude reading of -10dBm ± 0.09dB.

37. Record the reverse sign value of the power ratio displayed on the Power Meter in Table 3-23.

38. On the SG3,press the CW and up keys.
    On the R3272,press the FREQ and Δ keys.
    At each new frequency, repeat steps (35) through (37), rotating the CAL FACTOR switch to the Power Sensor's calibration factor.

[Test Results]

39. Frequency Response (R3465/3272/3263/3463 : 9kHz to 3.0GHz Band)

    ① Enter the most positive number from Table 3-17,
    Power Meter Reading : _____dB
    The absolute value of this number should be less than 5dB.

    ② Enter the most negative number from Table 3-17,
    Power Meter Reading : _____dB
    The absolute value of this number should be less than 5dB.

    ③ Subtract ② from ① : _____dB
    The result should be less than 3dB.

40. Frequency Response (R3465/3272/3263/3463 : 50MHz to 3.0GHz Band)

① Enter the most positive number from Table 3-17,Power Meter Reading within the range of 100MHz to 3GHz frequency : _____dB

② Enter the most negative number from Table 3-17,Power Meter Reading within the range of 100MHz to 3.0GHz frequency : _____dB

③ Subtract ② from ①: _____dB
The result should be less than 2dB.

41. Frequency Response(R3465 : 1.7GHz to 7.0GHz Band)
(R3272 : 3.0GHz to 7.5GHz Band)

① Enter the most positive number from Table 3-18 and 3-19,
Power Meter Reading : _____dB
The absolute value of this number should be less than 5dB.

② Enter the most negative number from Table 3-18 and 3-19,
Power Meter Reading : _____dB
The absolute value of this number should be less than 5dB.

③ Subtract ② from ①: _____dB
The result should be less than 3dB.

42. Frequency Response (R3465 : 6.9 to 8GHz Band)(R3271:7.4 to 15.4GHz Band)

① Enter the most positive number from Table 3-20 and 3-21,
Power Meter Reading : _____dB
The absolute value of this number should be less than 5dB.

② Enter the most negative number from Table 3-20 and 3-21,
Power Meter Reading : _____dB
The absolute value of this number should be less than 5dB.

③ Subtract ② from ①: _____dB
The result should be less than 7dB.(R3465 : 3dB)

43. Frequency Response (R3272 : 15.2 to 23.3GHz Band)

① Enter the most positive number from Table 3-22,
Power Meter Reading : _____dB
The absolute value of this number should be less than 5dB.

② Enter the most negative number from Table 3-22,
Power Meter Reading : _____dB
The absolute value of this number should be less than 5dB.

③ Subtract ② from ①: _____dB
The result should be less than 8dB.

44. Frequency Response (R3272 :23 to 26.5GHz Band)

① Enter the most positive number from Table 3-23,
Power Meter Reading : _____dB
The absolute value of this number should be less than 5dB.

② Enter the most negative number from Table 3-23,
Power Meter Reading : _____dB

The absolute value of this number should be less than 5dB.

③ Subtract ② from ①: _____dB
The result should be less than 8dB.

Table 3-17 Frequency Response (R3465/3272/3263/3463 : 9kHz to 3.0GHz Band)

Column 1	Column 2	Column 3
Frequency (MHz)	Power Meter Reding (dB)	CAL Factor Freq. (GHz)
100		0.05
200		0.05
300		0.05
400		0.05
500		0.05
600		0.05
700		0.05
800		0.05
900		0.05
1000		1.0
1100		1.0
1200		1.0
1300		1.0
1400		1.0
1500		1.0
1600		1.0
1700		1.0
1800		1.0
1900		1.0
2000		2.0
2100		2.0
2200		2.0
2300		2.0
2400		2.0
2500		2.0
2600		2.0
2700		2.0
2800		2.0
2900		2.0
3000		3.0

Table 3-18 Frequency Response (R3465 : 1.7GHz to 7.0GHz Band)

Column 1	Column 2	Column 3
Frequency (GHz)	Power Meter Reding (dB)	CAL Factor Freq. (GHz)
1.7		1.0
1.8		1.0
1.9		1.0
2.0		2.0
2.1		2.0
2.2		2.0
2.3		2.0
2.4		2.0
2.5		2.0
2.6		2.0
2.7		2.0
2.8		2.0
2.9		2.0
3.0		3.0
3.1		3.0
3.2		3.0
3.3		3.0
3.4		3.0
3.5		3.0
3.6		3.0
3.7		3.0
3.8		3.0
3.9		3.0
4.0		4.0
4.1		4.0
4.2		4.0
4.3		4.0
4.4		4.0
4.5		4.0
4.6		4.0
4.7		4.0
4.8		4.0
4.9		4.0
5.0		5.0
5.1		5.0
5.2		5.0
5.3		5.0
5.4		5.0
5.5		5.0
5.6		5.0
5.7		5.0
5.8		5.0
5.9		5.0
6.0		6.0
6.1		6.0
6.2		6.0
6.3		6.0
6.4		6.0
6.5		6.0
6.6		6.0
6.7		6.0
6.8		6.0
6.9		6.0
7.0		7.0

Table 3-19 Frequency Response (R3272 : 3.0GHz to 7.5GHz Band)

Column 1	Column 2	Column 3
Frequency (GHz)	Power Meter Reding (dB)	CAL Factor Freq. (GHz)
3.0		3.0
3.1		3.0
3.2		3.0
3.3		3.0
3.4		3.0
3.5		3.0
3.6		3.0
3.7		3.0
3.8		3.0
3.9		3.0
4.0		4.0
4.1		4.0
4.2		4.0
4.3		4.0
4.4		4.0
4.5		4.0
4.6		4.0
4.7		4.0
4.8		4.0
4.9		4.0
5.0		5.0
5.1		5.0
5.2		5.0
5.3		5.0
5.4		5.0
5.5		5.0
5.6		5.0
5.7		5.0
5.8		5.0
5.9		5.0
6.0		6.0
6.1		6.0
6.2		6.0
6.3		6.0
6.4		6.0
6.5		6.0
6.6		6.0
6.7		6.0
6.8		6.0
6.9		6.0
7.0		7.0
7.1		7.0
7.2		7.0
7.3		7.0
7.4		7.0

Table 3-20 Frequency Response (R3465 : 6.9GHz to 8GHz Band)

Column 1	Column 2	Column 3
Frequency (GHz)	Power Meter Reding (dB)	CAL Factor Freq. (GHz)
6.9		6.0
7.1		7.0
7.3		7.0
7.5		7.0
7.7		7.0
7.9		7.0

Table 3-21 Frequency Response (R3272 : 7.4GHz to 15.4GHz Band)

Column 1	Column 2	Column 3
Frequency (GHz)	Power Meter Reding (dB)	CAL Factor Freq. (GHz)
7.5		7.0
7.7		7.0
7.9		7.0
8.1		8.0
8.3		8.0
8.5		8.0
8.7		8.0
8.9		8.0
9.1		9.0
9.3		9.0
9.5		9.0
9.7		9.0
9.9		9.0
10.1		10.0
10.3		10.0
10.5		10.0
10.7		10.0
10.9		10.0
11.1		11.0
11.3		11.0
11.5		11.0
11.7		11.0
11.9		11.0
12.1		12.0
12.3		12.0
12.5		12.0
12.7		12.0
12.9		12.0
13.1		13.0
13.3		13.0
13.5		13.0
13.7		13.0
13.9		13.0
14.1		14.0
14.3		14.0
14.5		14.0
14.7		14.0
14.9		14.0
15.1		15.0
15.3		15.0

Table 3-22 Frequency Response (R3272 : 15.2GHz to 23.3GHz Band)

Column 1	Column 2	Column 3
Frequency (GHz)	Power Meter Reding (dB)	CAL Factor Freq. (GHz)
15.4		15.0
15.6		15.0
15.8		15.0
16.0		16.0
16.2		16.0
16.4		16.0
16.6		16.0
16.8		16.0
17.0		17.0
17.2		17.0
17.4		17.0
17.6		17.0
17.8		17.0
18.0		18.0
18.2		18.0
18.4		18.0
18.6		18.0
18.8		18.0
19.0		19.0
19.2		19.0
19.4		19.0
19.6		19.0
19.8		19.0
20.0		20.0
20.2		20.0
20.4		20.0
20.6		20.0
20.8		20.0
21.0		21.0
21.2		21.0
21.4		21.0
21.6		21.0
21.8		21.0
22.0		22.0
22.2		22.0
22.4		22.0
22.6		22.0
22.8		22.0
23.0		23.0
23.2		23.0

Table 3-23 Frequency Response (R3272 : 23GHz to 26.5GHz Band

Column 1	Column 2	Column 3
Frequency (GHz)	Power Meter Reding (dB)	CAL Factor Freq. (GHz)
23.4		23.0
23.6		23.0
23.8		23.0
24.0		24.0
24.2		24.0
24.4		24.0
24.6		24.0
24.8		24.0
25.0		25.0
25.2		25.0
25.4		25.0
25.6		25.0
25.8		25.0
26.0		26.0
26.2		26.0
26.4		26.0

3.4.14 IF Gain Uncertainty

DESCRIPTION

This test measures IF Gain error in RBW 10kHz and 3kHz.The input signal level is decreased as the spectrum analyzer's reference level is decreased (If gain increased). Since the signal level is decreased in precise steps, any error between the reference level and the signal level is caused by the analyzer's IF gain. The Synthesized Level Generator is phase-locked to the analyzer's 10MHz reference.

SPECIFICATION

IF Gain Uncertainty:
< ± 0.5dB, reference levels 0 dBm to -50dBm with 10dB input attenuation

RELATED ADJUSTMENT
IF amplitude adjustment.

EQUIPMENT

Synthesized Level Generator (SG4)
Cables:
BNC,150cm(Two required)

SETUP

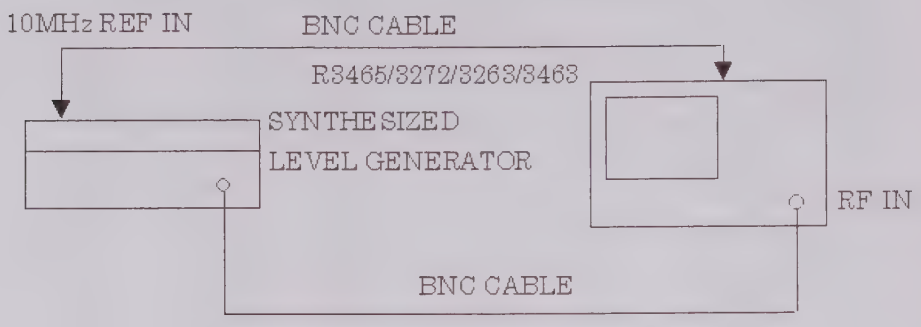

Figure 3-14 IF Gain Uncertainty Test Setup

PROCEDURE

1. Connect the equipment as shown in Figure 3-14.

2. Set the SG4 controls as follows:
   Frequency 30MHz
   Amplitude . . . . . -5dBm

3. Set the output level of the SG4 to the value 5dB lower than the R3465/3272/3263/3463 reference level.

4. After several sweeps in the R3465/3272/3263/3463,press the SINGLE and SRCH keys to read the data on the screen and record it as the reference value. Then, press the MARKER ON, *Delta MKR* and *FIXED MKR ON OFF* to set the FIXED MKR to ON.

5. Lower the SG4 level and the R3465/3272/3263/3463 reference level by 1dB. Press SINGLE key.

6. Press the SRCH key to read the marker level on the screen and record it in Table 3-24.

7. Repeat steps (6) and (7) until the SG4 is lowered to 10dB.

8. Lower the SG4 level and the R3465/3272/3263/3463 reference level by 10dB.

9. Press the SRCH key to read the data on the screen and record it in Table 3-24.

10. Repeat steps (9) and (10) until the SG4 is lowered to 50dB.

11. Repeat steps (2) to (11) above for the R3465/3272/3263/3463 RBW 3kHz. For RBW 3kHz,record the result in Table 3-25.

Table 3-24 IF Gain Error (RBW=10kHz,1dB/div)

Reference value _____(dBm)

R3465/3272/3263/3463 Reference Level (dBm)	SG4 (dBm)	Δ Marker level (dB)	Specification
0	-5	0(Ref.)	-
-1	-6		±0.5dB
-2	-7		±0.5dB
-3	-8		±0.5dB
-4	-9		±0.5dB
-5	-10		±0.5dB
-6	-11		±0.5dB
-7	-12		±0.5dB
-8	-13		±0.5dB
-9	-14		±0.5dB
-10	-15		±0.5dB
-20	-25		±0.5dB
-30	-35		±0.5dB
-40	-45		±0.5dB
-50	-55		±0.5dB

Table 3-25 IF Gain Error (RBW=3kHz, 1dB/div)

Reference value_____(dBm)

R3465/3272/3263/3463 Reference Level (dBm)	SG4 (dBm)	Δ Marker level (dB)	Specification
0	-5	0(Ref.)	-
-1	-6		±0.5dB
-2	-7		±0.5dB
-3	-8		±0.5dB
-4	-9		±0.5dB
-5	-10		±0.5dB
-6	-11		±0.5dB
-7	-12		±0.5dB
-8	-13		±0.5dB
-9	-14		±0.5dB
-10	-15		±0.5dB
-20	-25		±0.5dB
-30	-35		±0.5dB
-40	-45		±0.5dB
-50	-55		±0.5dB

3.4.15 Scale Fidelity

DESCRIPTION

This test measures display accuracy for 1dB,10dB log scales, x1 linear scales. All scales are measured with 0dBm reference signal. Figure 3-15 illustrates the measurement system of this test. The synthesized Level generator is phase-locked to the 10MHz reference source of the spectrum analyzer.

SPECIFICATION

Log Scale Fidelity : ± 0.2dB/1dB,
± 1 dB/10dB to a maximum of ± 1.5dB over 0 to 80dB range
Linear Scale Fidelity : < ± 15% of reference level

RELATED ADJUSTMENT

IF amplitude adjustment

EQUIPMENT

Synthesized Level Generator (SG4)
Cables:
BNC, 150cm(Two required)

SETUP

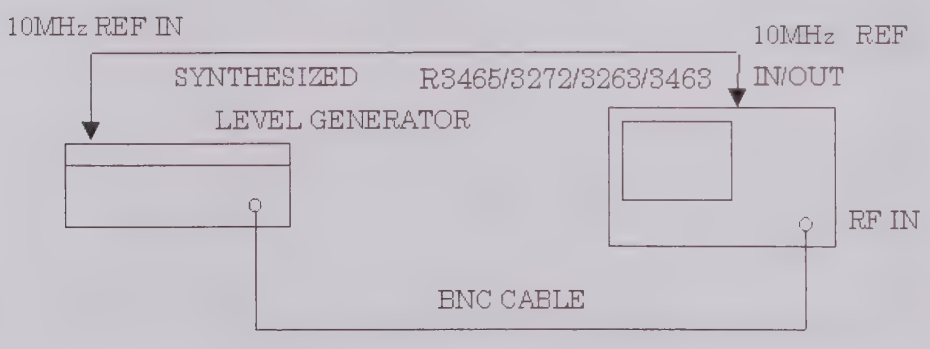

Figure 3-15 Scale Fidelity Test Setup

PROCEDURE

1. Connect the equipment as shown in Figure 3-15.

2. Set the SG4 controls as follows:
   Frequency 30MHz
   Amplitude . . . . . 0 dBm

3. On the R3465/3272/3263/3463,press the SHIFT and PRESET keys and set the controls as follows :
   Center Frequency 30MHz
   Freq Span. 0Hz
   Ref Level 0dBm
   RBW 3kHz
   VBW 1Hz
   dB/div 1dB/div
   Trace Detector . . . . . Posi

4. On the R3465/3272/3263/3463, press the MARKER ON.

[1dB/div Log Scale]

5. On the SG4, adjust the amplitude until the R3465/3272/3263 marker reads exactly 0.00 dBm.

6. On the R3465/3272/3263/3463,press the SINGLE key.

7. Lower the SG4 level by 1dB.

8. On the R3465/3272/3263/3463, press the SINGLE key.

9. Record the marker level in Table 3-26.Calculate the incremental error according to the following equation and record the result in the Incremental Error column in Table 3-26.
   Incremental Error=(Current marker level) - (Previous marker level) + 1dB

10. Repeat steps (7) to (9) until the SG4 level set to the value 10dB lower than the initially set level.

[10dB/div Log Scale]

11. On the R3465/3272/3263/3463, press the REPEAT, LEVEL, *dB/div*, and *10dB/div* keys.

12. Set the SG4 level so that the R3465/3272/3263/3463 marker indicates just 0.00dBm.

13. Lower the SG4 level by 10dB.

14. On the R3465/3272/3263/3463,press the SINGLE key.

15. Record the marker level in Table 3-27. Calculate the incremental error from the following expression and record the result in the Incremental Error column in Table 3-27.
    Incremental error = (Current marker level) - (Previous marker level) + 10dB

16. Repeat steps (13) to (15) until the frequency synthesizer level is set to the value 80dB lower than the initially set level.

Table 3-26 1dB/div. Log Scale Fidelity (RBW=3kHz)

Input Signal Level (dBm, nominal)	dB from Reference Level (nominal)	Δ Marker Level			Incremental Error (dB)
		Min.(dBm)	Actual(dBm)	Max.(dBm)	
0	0	0	0(Ref.)	0	0(Ref.)
-1	-1	-1.2		-0.8	
-2	-2	-2.2		-1.8	
-3	-3	-3.2		-2.8	
-4	-4	-4.2		-3.8	
-5	-5	-5.2		-4.8	
-6	-6	-6.2		-5.8	
-7	-7	-7.2		-6.8	
-8	-8	-8.2		-7.8	
-9	-9	-9.2		-8.8	
-10	-10	-10.2		-9.8	

Table 3-27 10dB/div. Log Scale Fidelity (RBW=3kHz)

Input Signal Level (dBm, nominal)	dB from Reference Level (nominal)	Δ Marker Level			Incremental Error (dB)
		Min.(dBm)	Actual(dBm)	Max.(dBm)	
0	0	0	0(Ref.)	0	0(Ref.)
-10	-10	-11		-9	
-20	-20	-21		-19	
-30	-30	-31		-29	
-40	-40	-41		-39	
-50	-50	-51		-49	
-60	-60	-61		-59	
-70	-70	-71		-69	
-80	-80	-81		-79	

[Linear Scale]

17. Set the SG4 as follows :
    Frequency 30MHz
    Amplitude 0dBm

18. On the R3465/3272/3263/3463, press the SHIFT and PRESET keys and set the controls as follows:
    Center Freq 30MHz
    Freq Span. 0kHz
    Ref Level 0dBm
    RBW 3kHz
    VBW 1kHz

Trace Detector . . . . . Posi

19. On the R3465/3272/3263/3463, press the LEVEL, *LINEAR* and *x1* keys to select the linear x1 mode. Then, press the MARKER ON key.

20. Presicely set the SG4 level to the R3465/3272/3263/3463 reference level while reading the marker level on the screen.

21. On the R3465/3272/3263/3463,press the SINGLE key to set the single sweep mode.

22. Read the level value displayed on the SG4 and set the value as the reference value(Ref). Then, set the frequency synthesizer level to the value 0.92dB lower than the reference value.

23. On the R3465/3272/3263/3463,perform single sweep, read the marker level and record it in Table 3-27.

24. Set the SG4 level as shown in the Input Signal Level column in Table 3-28 sequentially and repeat step (23) for each.

Table 3-28 Linear Scale Fidelity(x1)

Input Signal Level		Div. from Reference Level	Δ Marker Level		
(dBm, nominal)	(mV, nominal)		Min.(mV)	Actual(mV)	Max.(mV)
0(Ref.)	223.6	0	223.6	223.6(Ref.)	223.6
-0.92	201.24	1	167.7		234.8
-1.94	178.88	2	145.3		212.5
-3.10	156.52	3	122.9		190.1
-4.44	134.16	4	100.6		167.7
-6.02	111.8	5	78.2		145.5
-7.96	89.44	6	55.9		122.0
-10.46	67.08	7	33.5		100.7
-13.98	44.72	8	11.1		78.3

3.4.16 Input Attenuator Accuracy

DESCRIPTION

This test measures the input attenuator's switching accuracy over the full 70dB.
The number of frequency measured points are one point at 4GHz for the R3465,one point at 1.5GHz for the R3263/3463 and three points at 4GHz, 15GHz and 18GHz for the R3272.
The synthesized sweeper is phase-locked to the spectrum analyzer's 10MHz reference.
The input attenuator switching accuracy is referenced to the 10dB attenuator setting.Step-to-step accuracy is calculated from switching accuracy data.

SPECIFICATION

Input attenuator accuracy
(referenced to 10dB input attenuation, for 20 to 70dB settings) :
R3465 : 9kHz to 8GHz : < ± 1.1dB/10dB step to a maximum of ± 2.0dB
R3272 : 9kHz to 12.4GHz : < ± 1.1dB/10dB step to a maximum of ± 2.0dB
12.4GHz to 18GHz : <± 1.3dB/10dB step to a maximum of ± 2.5dB
18kHz to 26.5GHz : < ± 1.8dB/10dB step to a maximum of ± 3.5dB
R3263/3463: 9kHz to 3GHz : < ±1.1dB/10dB step to a maximum of ± 2.0dB

RELATED ADJUSTMENT

Nil.

EQUIPMENT

Synthesized Sweeper(SG1)
Cables:
BNC, 150cm
SMA, 70cm

SETUP

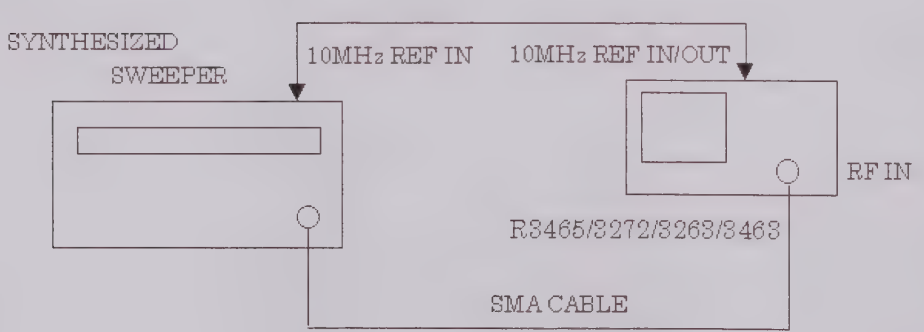

Figure 3-16 Input Attenuator Switching Accuracy Test Setup

PROCEDURE

1. IF gain uncertainty is measured when RBW is set to 3kHz and the result is filled in on the IF Gain uncertainty of Table 3-29. For the test method,refer to "3.4.14 IF Gain Uncertainty".

CAUTION: ***Measure IF gain uncertainty when the RBW is set to 3kHz before doing this test. IF gain uncertainty is included in the measurement result because of IF gain's changing and measuring in this test.***

---

2. Connect the equipment as shown in Figure 3-16.

3. Set the SG1 controls as follows:
   Frequency (For the R3465/3272) 4GHz
   (For the R3263/3463) 1.5GHz
   Amplitude . . . . . -5dBm

4. On the R3465/3272/3263/3463,press the SHIFT and PRESET keys and set the controls as follows:
   Center Frequency (for the R3465/3272) 4GHz
   (for the R3263/3463) 1.5GHz
   Frequency Span 10kHz
   Ref Level 0dBm
   dB/div 1dB/div
   RBW 3kHz
   Trace Detector . . . . . Posi

5. On the SG4,adjust the POWER LEVEL to the value 5dB lower than the R3465/3272/3263/3463 reference level.

6. On the R3465/3272/3263/3463,press the SINGLE key.
   Press the SRCH key, read the MKR level and record it in Table 3-29 as the reference value.

7. On the R3465/3272/3263/3463,press the *ATT and ATT AUTO AUTO MNL* keys to set the ATT AUTO to MNL.

8. Press the D key.

9. On the R3465/3272/3263/3463,press the SINGLE key.
   Press the SRCH key, read the MKR level.The marker level measured here is subtracted from the reference value measure in the (6).
   IF gain uncertainty measured in the (1) is subtracted from the value.

   Records it in Table 3-29 as Actual MKR Reading.

Actual MKR Readin	=	Reference value measured in the (6)	-	Marker level measured in the (9)	-	IF gain uncertainty measured in the (1)

10. Repeat steps (7) through (9) for the remaining R3465/3272/3263/3463 ATT setting listed in Table 3-29.

11. Calculate the step-to-step accuracy as described in the following steps and record the results in Table 3-29. Step-to-step accuracy should be within the limits shown in Table 3-29.

[Step-to-step Accuracy Calculation]

12. For the 20dB ATT setting, switching accuracy becomes step-to-step accuracy.

13. For the 30,40,50,60,70dB ATT settings, subtract the 10dB down ATT switching accuracy from the current ATT switching accuracy.

14. Center Frequency is changed to 15GHz and 18GHz and the operation in (2) to (13) are executed for R3272.Fill in the value measured in the (1) when Center Frequency is 4GHz (1.5GHz for the R3263/3463) on the IF Gain Uncertainty Table 3-29

Table 3-29 Input Attenuator Accuracy

[R3465] Center frequency : 4GHz, Reference value _____(dBm)

R3465 Attenuator (dB)	IF Gain (dB)	IF Gain Uncertainty (dB)	Switching Accuracy			Step-to-Step Accuracy	
			Min. (dB)	Actual (dB)	Max. (dB)	Actual (dB)	Spec. (dB)
10	0	0	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)
20	10		-2		+2		±1.1
30	20		-2		+2		±1.1
40	30		-2		+2		±1.1
50	40		-2		+2		±1.1
60	50		-2		+2		±1.1
70	60		-2		+2		±1.1

[R3272] Center frequency : 4GHz, Reference value _____(dBm)

R3272 Attenuator (dB)	IF Gain (dB)	IF Gain Uncertainty (dB)	Switching Accuracy			Step-to-Step Accuracy	
			Min. (dB)	Actual (dB)	Max. (dB)	Actual (dB)	Spec. (dB)
10	0	0	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)
20	10		-2		+2		±1.1
30	20		-2		+2		±1.1
40	30		-2		+2		±1.1
50	40		-2		+2		±1.1
60	50		-2		+2		±1.1
70	60		-2		+2		±1.1

[R3272] Center frequency : 15GHz, Reference value _____(dBm)

R3272 Attenuator (dB)	IF Gain (dB)	IF Gain Uncertainty (dB)	Switching Accuracy			Step-to-Step Accuracy	
			Min. (dB)	Actual (dB)	Max. (dB)	Actual (dB)	Spec. (dB)
10	0	0	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)
20	10		-2.5		+2.5		±1.3
30	20		-2.5		+2.5		±1.3
40	30		-2.5		+2.5		±1.3
50	40		-2.5		+2.5		±1.3
60	50		-2.5		+2.5		±1.3
70	60		-2.5		+2.5		±1.3

[R3272] Center frequency : 18GHz, Reference value _____(dBm)

R3272 Attenuator (dB)	IF Gain (dB)	IF Gain Uncertainty (dB)	Switching Accuracy			Step-to-Step Accuracy	
			Min. (dB)	Actual (dB)	Max. (dB)	Actual (dB)	Spec. (dB)
10	0	0	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)
20	10		-3.5		+3.5		±1.8
30	20		-3.5		+3.5		±1.8
40	30		-3.5		+3.5		±1.8
50	40		-3.5		+3.5		±1.8
60	50		-3.5		+3.5		±1.8
70	60		-3.5		+3.5		±1.8

[R3263/3463] Center frequency : 15GHz, Reference value _____(dBm)

R3263/ 34632 Attenuator (dB)	IF Gain (dB)	IF Gain Uncertainty (dB)	Switching Accuracy			Step-to-Step Accuracy	
			Min. (dB)	Actual (dB)	Max. (dB)	Actual (dB)	Spec. (dB)
10	0	0	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)	0(Ref.)
20	10		-2		+2		±1.1
30	20		-2		+2		±1.1
40	30		-2		+2		±1.1
50	40		-2		+2		±1.1
60	50		-2		+2		±1.1
70	60		-2		+2		±1.1

3.4.17 Calibration Amplitude Accuracy

DESCRIPTION

The amplitude accuracy of the CALOUT signals are checked for -10dBm ± 0.3dBm.

SPECIFICATION

Amplitude : -10dBm ± 0.3dB

RELATED ADJUSTMENT

Calibration amplitude adjustment.

EQUIPMENT

Power Meter
Power Sensor (Sensor 2)

SETUP

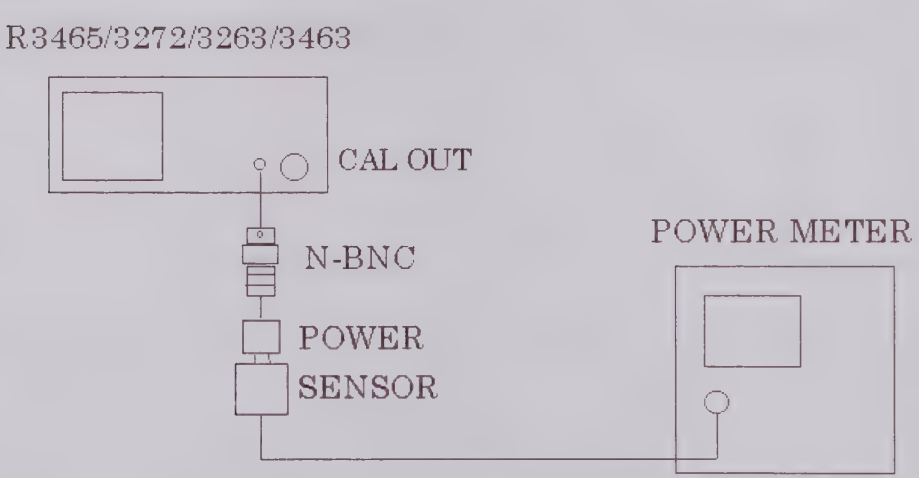

Figure 3-17 Calibration Amplitude Accuracy Test Setup

PROCEDURE

1. Connect the equipment as shown in Figure 3-17.

2. Press the Power Sensor zero of the Power Meter and calibrate the Power Sensor. Enter the Power Sensor's 30MHz calibration factor into the Power Meter.

3. Connect the Power Sensor via an N(f) - BNC(m) adapter directly to the CALOUT connector. Read the Power Meter display. The power level should be within the following limits(± 0.3dB): Actual

   -10.3dBm ≤ _____ ≤ -9.7dBm

3.4.18 CDMA Performance Verification (Option 61)

DESCRIPTION

Verify CDMA function under Forward Link, Wave Quality condition.
To generate CDMA modulation signal which complies IS95 standard, use arbitrary waveform generator.

SPECIFICATION

Waveform Quality (ρ) . . . . . 0.9996 < ρ < 1.000
Time Allighment Error (τ) . . . . . < ± 250nSec
Frequency Error . . . . . < ± 8Hz

EQUIPMENT

Arbitrary Waveform Generator . . . . . SG5(AWG 2021 with Opt02 or Equivalent)
Signal Generator SG6 (MG3670B)
Cables . . . . . BNC(m)-BNC(m) x 5pcs

SETUP

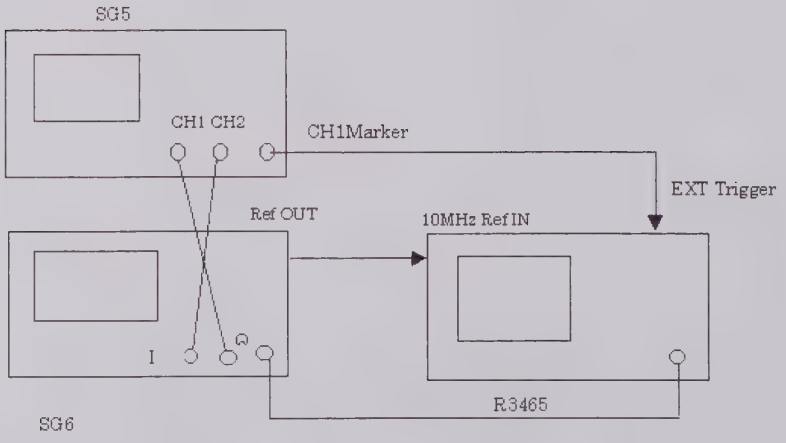

Figure 3-18 CDMA Functional Check Setup

PROCEDURE

1. Connect equipment as shown Figure 3-18

2. Set I signal data, which complies IS95 standard for CH1 of SG5.

3. Set Q signal data, which copmlies IS 95 standard for CH2 of SG5.

4. Set SG6 controls as follows:
   - Modulation Mode . . . . . IQ
   - IQ Source. . . . . EXT
   - Frequency 800MHz
   - Level . . . . . -10dBm

5. Set R3465 controls as follows:
   - Reference 10MHz . . . . . EXT
   - TRANSIENT LINK . . . . . FORWARD
   - Frequency 800MHz
   - Wave Quality . . . . .
     - Meas Range . . . . . 20(1280chip)
     - τ offset . . . . . Default
     - Equalizing Filter. . . . . ON
     - PN Offset Search Mode . . OFF
     - PN Offset 0
     - Trigger Source . . . . . EXT
     - Ext Trigger Slope . . . . . +
     - Ext Trigger Delay. . . . . 0.000 chip
     - AVG Times. 5

6. Set Auto Level Set, then wait average completed.

7. Set SINGLE for measurement start.

8. Confirm measurement result within specification.
   Rho(ρ) is 0.9996 < Rho(ρ) < 1.000
   Frequency Error <$\pm$ 8Hz
   Memorize Tau (ρ) as A for calculation.

9. Set R3465 controls as follows:
   - AVG. . . . . OFF
   - τ Offset . . . . . User
   - ρ. . . . . A - 1

10. Execute measurement for 5 times

11. Confirm measurement result is within $\pm$ 250nSec.

3.5 Checklist/Data Form

File No.	:		Description	:	SPECTRUM ANALYZER
UUT MFR	:	ADVANTEST CO.	ID No.	:	
Model	:	R3465/3272/3263/3463	Date	:	

Table 3-30 Performance Test Record (1 of 9)

Para. No.	Test Description	Results		
		Min.	Actual	Max.
1	Frequency Readout Accuracy and Frequency Counter Marker Accuracy			
	Frequency Readout Accuracy			
	1.5GHz CENTER FREQ			
	1MHz SPAN	1.49998835GHz		1.50001165GHz
	10MHz SPAN	1.49958484GHz		1.50041516GHz
	50MHz SPAN1	1.49784984GHz		1.50215016GHz
	100MHz SPAN	1.49584984GHz		1.40415016GHz
	2GHz SPAN	1.41924984GHz		1.58075016GHz
	5.0GHz CENTER FREQ			5.00001201GHz
	1MHz SPAN	4.99998799GHz		5.00041566GHz
	10MHz SPAN	4.99958434GHz		5.00215051GHz
	50MHz SPAN	4.99784949GHz		5.00415051GHz
	100MHz SPAN	4.99584949GHz		5.08075051GHz
	2GHz SPAN	4.91924949GHz		
	<R3272 ONLY>			
	11.0GHz CENTER FREQ			
	1MHz SPAN	10.99998739GHz		11.00001261GHz
	10MHz SPAN	10.99958499GHz		11.00041501GHz
	50MHz SPAN	10.99784889GHz		11.00215111GHz
	100MHz SPAN	10.99584889GHz		11.00415111GHz
	2GHz SPAN	10.91924889GHz		11.08075111GHz
	18.0GHz CENTER FREQ			
	1MHz SPAN	17.99998669GHz		18.00001331GHz
	10MHz SPAN	17.99958319GHz		18.00041681GHz
	50MHz SPAN	17.99784819GHz		18.00215181GHz
	100MHz SPAN	17.99584819GHz		18.00415181GHz
	2GHz SPAN	17.91924819GHz		18.08075181GHz
	Frequency Counter Marker Accuracy			
	1.5GHz CENTER FREQ	1.499999844GHz		1.50000156GHz
	5.0GHz CENTER FREQ	4.999999494GHz		5.000000506GHz
	11.0GHz CENTER FREQ	10.999998889GHz		11.000001111GHz
	18.0GHz CENTER FREQ	17.999998184GHz		18.000001816GHz
2	Frequency Reference Output Accuracy			
	10MHz Reference Frequency	29.9999970MHz		30.0000030MHz

Table 3-30 Performance Test Record (2 of 9)

Para. No.	Test Description	Results		
		Min.	Actual	Max.
3	Noise Sidebands			
	1.5GHz Center frequency			-100dBc/Hz
	10kHz Offset -110dBc/Hz			-110dBc/Hz
	100kHz Offset			
	<R3465/3272 ONLY>			
	3.5GHz Center Frequency			
	10kHz offset -98dBc/Hz			-98dBc/Hz
	100kHz offset -108dBc/Hz			-108dBc/Hz
4	Frequency Span Accuracy			
	1.5GHz Center Frequency			
	5MHz SPAN	3.96MHz		4.04MHz
	5.01MHz SPAN	3.847MHz		4.169MHz
	40MHz SPAN	30.72MHz		33.28MHz
	400MHz SPAN	384MHz		416MHz
	<R3465/3272 ONLY>			
	4.0GHz Center Frequency			
	4GHz SPAN	3.84GHz		4.16GHz
	8GHz SPAN	7.68GHz		8.32GHz
	<R3272 ONLY>			
	10GHz Center Frequency	7.68GHz		8.32GHz
	19GHz Center Frequency	15.36GHz		16.64GHz
5	Resolution Bandwidth Accuracy and Selectivity Resolution Bandwidth Accuracy			
	5MHz	3.50MHz		6.5MHz
	3MHz	2.1MHz		3.9MHz
	1MHz	800kHz		1.2MHz
	300kHz	240kHz		360kHz
	100kHz	80kHz		120kHz
	30kHz	24kHz		36kHz
	10kHz	8.0kHz		12.0kHz
	3kHz	2.4kHz		3.6kHz
	1kHz	800Hz		1200Hz
	300Hz	210Hz		390Hz
	Resolution Bandwidth Selecetivity			
	5MHz			15
	3MHz			15
	1MHz			15

Table 3-30 Performance Test Record (3 of 9)

Para. No.	Test Description	Results		
		Min.	Actual	Max.
5	300kHz			15
	100kHz			15
	30kHz			15
	10kHz			15
	3kHz			15
	1kHz			15
	300Hz			15
6	Resolution Bandwidth Switching Uncertainty			
	3MHz	-0.3dB		+0.3dB
	1MHz	-0.3dB		+0.3dB
	300kHz		0(Ref)	
	100kHz	-0.3dB		+0.3dB
	30kHz	-0.3dB		+0.3dB
	10kHz	-0.3dB		+0.3dB
	3kHz	-0.3dB		+0.3dB
	1kHz	-0.3dB		+0.3dB
	300Hz	-0.3dB		+0.3dB
7	Displayed Average Noise Level <R3465 ONLY>			
	10kHz -70.0dBm			-70.0dBm
	100kHz -80.0dBm			-80.0dBm
	1MHz -114.99dBm			-114.99dBm
	100MHz			-114.84dBm
	500MHz			-114.22dBm
	1.0GHz			-113.45dBm
	1.5GHz			-112.67dBm
	2.0GHz			-111.90dBm
	2.5GHz			-111.12dBm
	3.0GHz			-110.35dBm
	1.7GHz to 7.0GHz			-115dBm
	6.9GHz to 8.0GHz			-115dBm
	<R3272 ONLY>			
	10kHz			-70.0dBm
	100kHz			-80.0dBm
	1MHz			-114.99dBm
	100MHz			-114.84dBm
	500MHz			-114.22dBm
	1GHz			-113.45dBm
	1.5GHz			-112.67dBm
	2GHz			-111.90dBm
	2.5GHz			-111.12dBm

Table 3-30 Performance Test Record (4 of 9)

Para. No.	Test Description	Results		
		Min.	Actual	Max.
7	3GHz			-110.35dBm
	3.0GHz to 7.5GHz			-110.0dBm
	7.4GHz to 15.4GHz			-103.0dBm
	15.2GHz to 23.3GHz			-96.0dBm
	23GHz to 26.5GHz			-90.0dBm
	<R3263/3463 ONLY>			
	10kHz			-70.0dBm
	100kHz			-80.0dBm
	1MHz			-114.99dBm
	100MHz			-114.84dBm
	500MHz			-114.22dBm
	1GHz			-113.45dBm
	1.5GHz			-112.67dBm
	2.0GHz			-111.90dBm
	2.5GHz			-111.12dBm
	3.0GHz			-110.35dBm
8	Gain Compression			
	820.5MHz	-5dBm		
	<R3465/3272 ONLY>			
	3200.5MHz -5dBm	-5dBm		
9	Residual Response			
	1MHz to 3.0GHz			-100dBm
	<R3465 ONLY>			
	1.7GHz to 8.0GHz			-90dBm
	<R3272 ONLY>			
	3.0GHz to 26.5GHz			-90dBm
10	Second Harmonic Distortion			
	INPUT FREQ : 1.4GHz			-70dBc
	INPUT FREQ : 1.9GHz			-100dBc
11	Third Order Intermodulation Distortion			Mixer Input Level : -20dBm
	820.005MHz			: -55dBc
	3200.005MHz			: -55dBc

Table 3-30 Performance Test Record (5 of 9)

Para. No.	Test Description	Results		
		Min.	Actual	Max.
12	Image,Multiple and out-of-Band Response			
	Maximum Response Amplitude			
	<R3465 ONLY>			
	10MHz to 8GHz			-70dBc
	<R3272 ONLY>			
	10MHz to 18GHz			-70dBc
	10MHz to 23GHz			-60dBc
	10MHz to 26.5GHz			-50dBc
	<R3263/3463 ONLY>			
	10MHz to 3GHz			-70dBc
13	Frequency Response			
	<R3465 ONLY>			
	9kHz to 3.0GHz	-1.5dB		+1.5dB
	50MHz to 3.0GHz	-1.0dB		+1.0dB
	1.7GHz to 7.5GHz	-1.5dB		+1.5dB
	7.4GHz to 8GHz	-1.5dB		+1.5dB
	<R3272 ONLY>			
	9kHz to 3.0GHz	-1.5dB		+1.5dB
	50MHz to 3.0GHz	-1.0dB		+1.0dB
	3.0GHz to 7.5GHz	-1.5dB		+1.5dB
	7.4GHz to 15.4Hz	-3.5dB		+3.5dB
	15.4GHz to 23.3GHz	-4.0dB		+4.0dB
	23.0GHz to 26.5GHz	-4.0dB		+4.0dB
	<R3263/3463 ONLY>			
	9kHz to 3.0GHz	-1.5dB		+1.5dB
	50MHz to 3.0GHz	-1.0dB		+1.0dB
14	IF Gain Uncertainty			
	RBW 10kHz REF LEVEL			
	0dBm	-0.5dB		+0.5dB
	-1dBm	-0.5dB		+0.5dB
	-2dBm	-0.5dB		+0.5dB
	-3dBm	-0.5dB		+0.5dB
	-4dBm	-0.5dB		+0.5dB
	-5dBm	-0.5dB		+0.5dB
	-6dBm	-0.5dB		+0.5dB
	-7dBm	-0.5dB		+0.5dB

Table 3-30 Performance Test Record (6 of 9)

Para. No.	Test Description	Results		
		Min.	Actual	Max.
14	-8dBm	-0.5dB		+0.5dB
	-9dBm	-0.5dB		+0.5dB
	-10dBm	-0.5dB		+0.5dB
	-20dBm	-0.5dB		+0.5dB
	-30dBm	-0.5dB		+0.5dB
	-40dBm	-0.5dB		+0.5dB
	-50dBm	-0.5dB		+0.5dB
		-0.5dB		+0.5dB
	RBW 3kHz REF LEVEL			
	0dBm	-0.5dB		+0.5dB
	-1dBm	-0.5dB		+0.5dB
	-2dBm	-0.5dB		+0.5dB
	-3dBm	-0.5dB		+0.5dB
	-4dBm	-0.5dB		+0.5dB
	-5dBm	-0.5dB		+0.5dB
	-6dBm	-0.5dB		+0.5dB
	-7dBm	-0.5dB		+0.5dB
	-8dBm	-0.5dB		+0.5dB
	-9dBm	-0.5dB		+0.5dB
	-10dBm	-0.5dB		+0.5dB
	-20dBm	-0.5dB		+0.5dB
	-30dBm	-0.5dB		+0.5dB
	-40dBm	-0.5dB		+0.5dB
	-50dBm	-0.5dB		+0.5dB
15	Scale Fidelity			
	1dB/div Log Scale Fidelity			
	-1dB	-0.2dB		+0.2dB
	-2dB	-0.2dB		+0.2dB
	-3dB	-0.2dB		+0.2dB
	-4dB	-0.2dB		+0.2dB
	-5dB	-0.2dB		+0.2dB
	-6dB	-0.2dB		+0.2dB
	-7dB	-0.2dB		+0.2dB
	-8dB	-0.2dB		+0.2dB
	-9dB	-0.2dB		+0.2dB
	-10dB	-0.2dB		+0.2dB
	Scale Fidelity (cont'd)			
	10dB/div Log Scale Fidelity			
	-10dB	-1dB		+1dB
	-20dB	-1dB		+1dB
	-30dB	-1dB		+1dB
	-40dB	-1dB		+1dB

Table 3-30 Performance Test Record (7 of 9)

Para. No.	Test Description	Results		
		Min.	Actual	Max.
15	-50dB	-1dB		+1dB
	-60dB	-1dB		+1dB
	-70dB	-1dB		+1dB
	-80dB	-1dB		+1dB
	Linear Scale Fidelity div from Ref Level			
	1	167.7mV		234.8mV
	2	145.3mV		212.5mV
	3	122.9mV		190.1mV
	4	100.6mV		167.7mV
	5	78.2mV		145.4mV
	6	55.9mV		122.0mV
	7	33.5mV		100.7mV
	8	11.1mV		78.3mV
16	Input Attenuator Accuracy			
	<R3465/3272 ONLY> (4GHz Center Freq)			
	Switching Accuracy			
	20dB	-2dB		+2dB
	30dB	-2dB		+2dB
	40dB	-2dB		+2dB
	50dB	-2dB		+2dB
	60dB	-2dB		+2dB
	70dB	-2dB		+2dB
	Step-to-step Accuracy			
	20dB	-1.1dB		+1.1dB
	30dB	-1.1dB		+1.1dB
	40dB	-1.1dB		+1.1dB
	50dB	-1.1dB		+1.1dB
	60dB	-1.1dB		+1.1dB
	70dB	-1.1dB		+1.1dB
	<R3272 ONLY> (15GHz Center Freq)			
	Switching Accuracy	-2.5dB		+2.5dB
	20dB	-2.5dB		+2.5dB
	30dB	-2.5dB		+2.5dB
	40dB	-2.5dB		+2.5dB
	50dB	-2.5dB		+2.5dB

Table 3-30 Performance Test Record (8 of 9)

Para. No.	Test Description	Results		
		Min.	Actual	Max.
16	60dB	-2.5dB		+2.5dB
	70dB	-2.5dB		+2.5dB
	<R3272 ONLY>			
	(15GHz Center Freq)			
	Step-to-step Accuracy			
	20dB	-1.3dB		+1.3dB
	30dB	-1.3dB		+1.3dB
	40dB	-1.3dB		+1.3dB
	50dB	-1.3dB		+1.3dB
	60dB	-1.3dB		+1.3dB
	70dB	-1.3dB		+1.3dB
	(18GHz Center Freq)			
	Switching Accuracy			
	20dB	-3.5dB		+3.5dB
	30dB	-3.5dB		+3.5dB
	40dB	-3.5dB		+3.5dB
	50dB	-3.5dB		+3.5dB
	60dB	-3.5dB		+3.5dB
	70dB	-3.5dB		+3.5dB
	Step-to-step Accuracy			
	20dB	-1.8dB		+1.8dB
	30dB	-1.8dB		+1.8dB
	40dB	-1.8dB		+1.8dB
	50dB	-1.8dB		+1.8dB
	60dB	-1.8dB		+1.8dB
	70dB	-1.8dB		+1.8dB
	<R3263/3463 ONLY>			
	(1.5GHz Center Freq)			
	Switching Accuracy			
	20dB	-2dB		+2dB
	30dB	-2dB		+2dB
	40dB	-2dB		+2dB
	50dB	-2dB		+2dB
	60dB	-2dB		+2dB
	70dB	-2dB		+2dB
	Step-to-step Accuracy			
	20dB	-1.1dB		+1.1dB
	30dB	-1.1dB		+1.1dB
	40dB	-1.1dB		+1.1dB

Table 3-30 Performance Test Record (9 of 9)

Para. No.	Test Description	Results		
		Min.	Actual	Max.
16	50dB 60dB 70dB	-1.1dB -1.1dB -1.1dB		+1.1dB +1.1dB +1.1dB
17	Calibration Amplitude Accuracy	-10.3dBm		-9.7dBm
18	CDMA Function cheek ρ τ Frequency Error	 0.9996 -250ns -8Hz		 1.000 250ns 8Hz

4 ADJUSTMENT

4.1 Internal Frequency Reference Adjustment

This section provides adjustment procedure of internal frequency reference.

DESCRIPTION

Adjust internal frequency reference oscillator to meet the specification.

This parameter specifies frequency measurement accuracy.

SPECIFICATION

2 x 10exp-8/day

EQUIPMENT

1. Frequency Comparator Generic
2. Frequency Standard Generic

SETUP

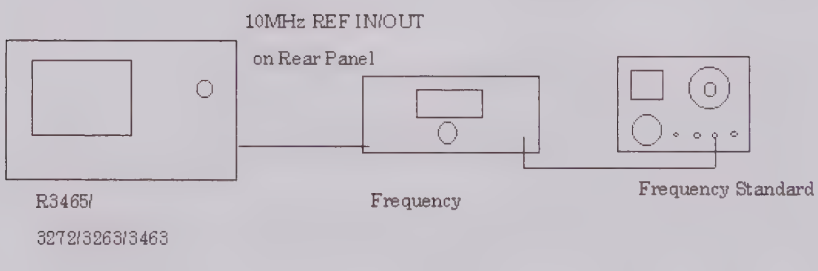

Figure 4-1 Internal Frequency Reference Adjustment Setup

PROCEDURE

1. Connect the equipment as shown in Figure 4-1.
2. Set the frequency comparator in 10 exp. - 8 range.
3. Set R3465/3273/3263/3453 to CAL 10MHz REF mode under CAL menu.
4. Adjust data -100 to 100 by data knob so that frequency compartor reading is within specification.
5. After adjust data, press the store key for saving data.
   Once press the store key, the dialogue box appears on the display.
   If it is OK to save, select "Confirm" by data knob then press data knob.

5 TROUBLESHOOTING

5.1 Preparation

5.1.1 Introduction

This section describes general information for handling replaceable assemblies.

WARNING: ***Only personnel with knowledge of electronic circuitry and awareness with hazards involved should remove and install any printed circuit board assemblies.***

CAUTION: ***To prevent equipment circuit damage, always remove the ac line power cord before removing or replacing any assembly.***
To prevent static zap of ICs, always observe anti-static techniques when assemblies are handled or serviced.

5.1.2 General Caution for Handling Replaceable Assemblies (BLOCK)

Static Handling

Static electricity is familiar phenomenon which, except for an occasional Shock, does not seems very serious. However, it has been proven that in the electronics industry electrostatic discharge (ESD)

is major cause of component failure. In many cases, the component damaged may not immediately fail, causing low instrument reliability and future repair. ESD damage can occur at static level below human perception. It has also been shown that ESD can affect both passive and active devices.

The following guidelines are the minimum requirements for a static safe service environment.

- The workbench should be equipped with a conductive tablemat. The mat should be grounded to the earth ground through a 1M-ohm resistor. The mat should be equipped with at least one swivel connector for connecting wrist strap.
- All service and handling personnel should wear a conductive wrist strap in contact with bare skin.
  This strap should be connected to the swivel connector on the conductive tablemat through a 1M ohm resistor.
- All the metal equipment at workstation must be grounded. This includes soldering irons, soldering removers, and equipment stand.
- Only one common ground should be provided at the workstation.
- The workstation should be kept free of nonconductors. No common plastics, polybags, cardboard, cigarette or candy wrappers should be allowed. There should not be rugs or carpet on the floor, shelving, or bench top.
- Only proper containers should be used for shipping, storing or transporting assemblies.
  This is required on any assembly shipped to ADVANTEST for repair.

Clean Handling

Due to the high performance of the R3131, use the following clean handling techniques when removing and installing assemblies.

- Handle the assemblies only by their edges.
  Be sure to place them on clean workbench away from dirty or dusty conditions.

5.2 Diagnostic Procedure.

To isolate failure block for troubleshooting, it uses information of power on self test and auto calibration function.

Repair will be done as assembly after determines failure block or module by these informations.

This section describes those function and summarized correspondence between the information and failure board or module for assembly level troubleshooting.

5.2.1 Equipment Required

To isolate failure block, it need to use equipment.

It is listed up in Table 5-1.

Table 5-1 Equipment list

Description Spectrum Analyzer	Key Specification required	Model Recommended
Spectrum Analyzer Cable Adapter	Frequency Range:to 3GHz UM(f)-BNC(m) N(m)-BNC(f)	R3131 DCB-FF4321X08A-1

5.2.2 Power on Self Test

It is execute automatically by every power on, to test logic circuit mainly.

Its result displays with messages on the display in case of failure found.

It is summarized as Table 5-2-1

Once failure block is determined, take replacement procedure describes in Section 5-3.

Table 5-2-1 Power On Self Test Result Display

Message Displayed	Failure Block
Handshake error occurred to TBC. Please report quaalified service person	TBC Block
Handshake error occurred to DSP. Please report qualified service person	MOD Block
Cannot detect Mod. DSP board. Please report to qualified service person	MOD Block
Broken Freq-Correction data. Please report to qualified service person.	RF Block

5.2.3 Auto Calibration Function

This function executes self-compensation by measurement error using built-in calibration signal.

If it detects any kind of unexpected result during auto calibration, displays the error message.

This section describes how to isolate failure block based on this message.

The items under auto calibration function, error messages and failure block suspected is shown Table 5-2-2.

Table 5-2-2 Error Message vs Failure Block

Parametre of Items	Message Displayed	Failure Block
INPUT ATT	Calibration filure	RF Block or SYNTHESIZER block
IF STEP AMP	Calibration filure	F/LOG Block
LOG LINEARITY	Calibration filure	F/LOG Block
TOTAL GAIN	Calibration filure	F/LOG Block
RBW SWITCHING	Calibration filure	F/LOG Block
AMPTD MAG	Calibration filure	F/LOG Block
NADC	Calibration filure	NADC Block
MOD DSP	Calibration filure	MOD Block

Once determines failure block, take replacement procedure to replace defective module which is described in section 5-3

5.2.4 Isolation RF Block and SYNTESIZER Block

In case of INPUT ATT calibration fail displayed, cause of failure is suspected in two blocks, RF Block and SYNTESIZER Block.

To isolate defective block wether RF Block or SYNTHESIZERBlock, take followings procedure.

Check of SYNTHESIZER Block Operation

DESCRIPTION

Check PLL function.

EQUIPMENT

Spectrum Analyzer	SPA
Cable	BNC(m)-BNC(m)
Adapter	Type N(m)-BNC(f)

SETUP

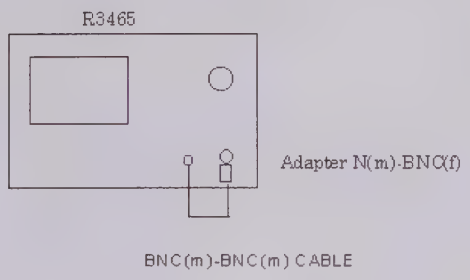

Figure 5-2-1 Check of SYNTHESIZER Block Operation Setup

Procedure

1. Connecte equioment as shown in Figure 5-2-1

2. After preset R3465, set R3465 controls as follows
   Center30MHz
   Span10MHz
   Reference level0dBm
   Input attenuator10dB
   RBW300kHz

3. Cange span setting shown in Table 5-2-3
   Then confirm calibration signal (30MHz, -10dB) stays center in stable.
   If calibartion signal jump to outside of screen, check SYNTHE PLL OUT signal on SYNTHESIZER Block following proceduire in check SYNTHESIZER PLL OUT.

Table 5-2-3 Setting of Span

Center	Span
30MHz	10MHz
	5MHz
	2MHz
	250kHz
	20kHz
	0Hz

4. After confirm signal stabilitiy, remove main chasis. Removing procedure refere to Section 5-3.

Check RF Block

SETUP

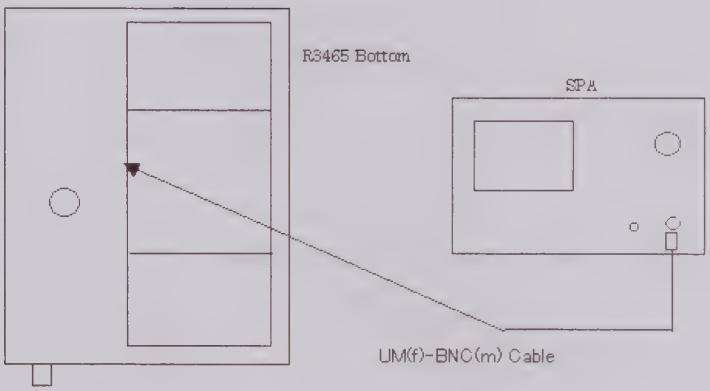

Figure 5-2-2 IF Signal Output Check Setup

5. Connect equipment,as shown in Figure 5-2-2
   Measurement point detailed, refer to Figure 5-2-3

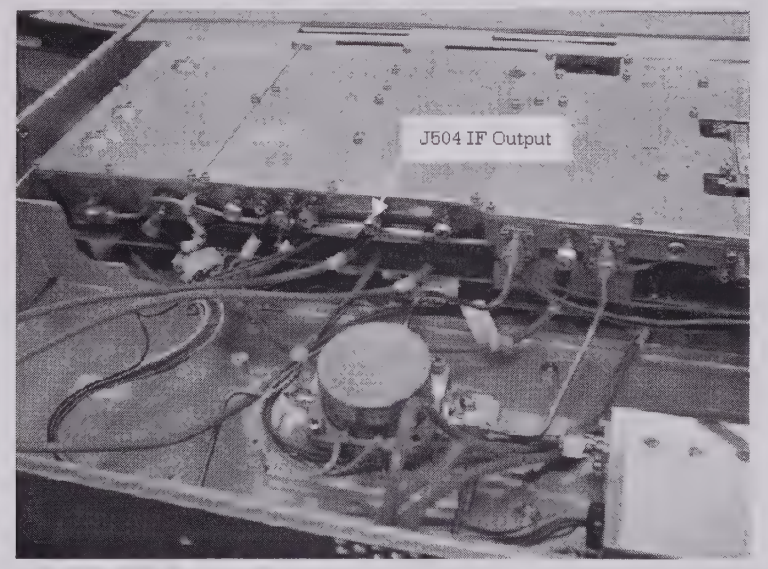

Figure 5-2-3 Check Point of IF Signal Output

6. Power switch of R3465 to on
   After preset R3465, set R3465 controls as follows:

Center	30MHz
Span	0MHz
Refernce level	0dBm
Input attenuator	10dB
RBW	300kHz

7. After preset SPA, set SPA controls as follows:

Center	21.4MHz
Span	10MHz
Reference level	-10dBm

Remove J504 connector, then connect UM(f)-BNC(m) cable reffer to Figure 5-2-3

8. Measurement display sample is shown Figure 5-2-4.

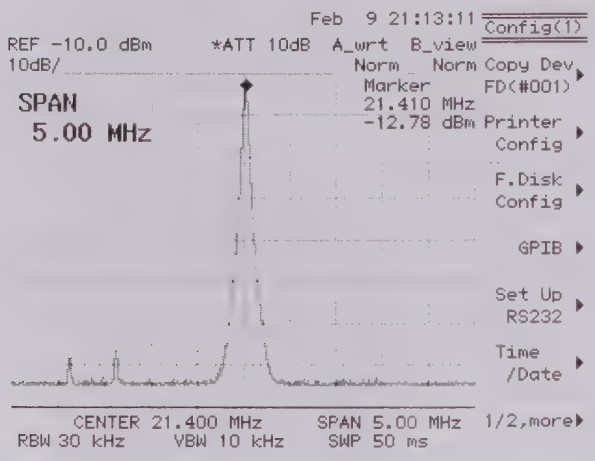

Figure 5-2-4 IF OUT Measurement Display

9. Switch R3465 input attenuator setting from 10 dB to 70dB, then check SPA measuement signal level is decreased 10dB step.
Table 5-2-4 is shown attenuator setting and norminal value expected.

Table 5-2-4 SPA Measurement Value Expected

Attenuator Setting(dB)	SPA measurement Value Expected(dBm)
10	-15
20	-25
30	-35
40	-45
50	-55
60	-65
70	-75

10. If any unexpected value found, RF Block is defectived.

11. Take replacement procedure, which is described in Section 5-3

Check SYNTHESIZER PLL OUT

DESCRIPTION

Check of 1st local PLL circuit, check by SAMP PLL signal from SYNTHESIZER Block.

SPECIFICATION

Frequency	209.75MHz
Level	5dBm +/- 3dB

EQUIPMENT

Spectrum Analyzer	SPA
Cable	UM(f)-BNC(m) Cable.

SETUP

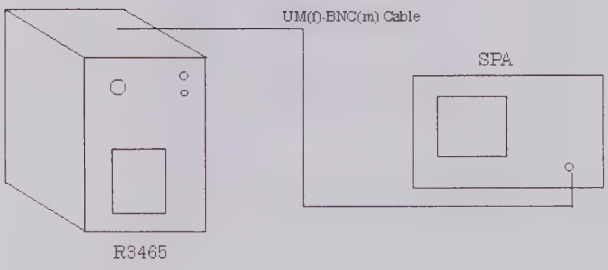

Figure 5-2-5 Check of PLL Setup

PROCEDURE

1. Remove main chassis following Section 5-3-3
2. Remove side shield cover
3. Power switch of R3465 to on.
4. After preset R3465, connect calibration signal as shown Figure 5-2-1
5. Set R3465 controls as follows:

Center	30MHz
Span	0MHz
Reference level	0dBm
Attenuator	10dB

6. Remove UM cable from J54, then connect UM(f)-BNC(m) cable to J54 on SYNTHESIZER Block.

7. Connect UM(f)-BNC(m) cable to J54 on SYNTHESIZER Block. Location of connector is as shown in Figure 5-2-6.

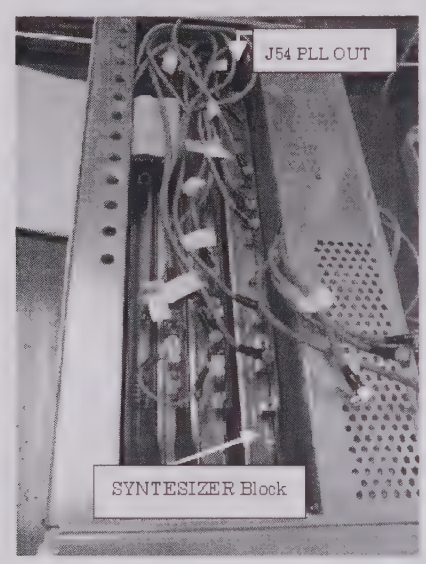

Figure 5-2-6 Location of J54

8. After preset SPA, set SPA controls as follows:

Center	209.75MHz
Span	1MHz
Reference level	10dBm

9. Measure SAMP PLL OUT signal, check the frequency and level. Specification is 207.5MHz, 5dBm +/- 3dB.

Actual measurement sample is shown Figure 5-2-7

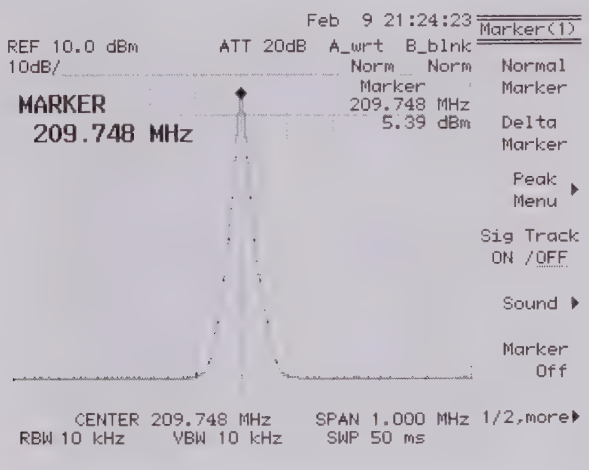

Figure 5-2-7 Sample of SAMP PLL OUT

10. Confirm SAMP PLL OUT signal's frequency and level are within specification.

11. If found any out of specification or unsuitability, SYNTHESIZER Block is defective. Take SYNTHESIZER Block removal/installation procedures described in Section 5-3-3

12. If SAMP PLL signal is within specification, RF Block is defective.
Take RF Block replacement procedure described in Section 5-3-2

5.3 Replacement Procedure

Once determined defective block, take following procedures to replace defective block to new one.

5.3.1 Tools Required

Following tools are required for a block removal and installation.

(1) M4mm Phillips screw driver x 1pc

(2) 2 mm hexagon key

(3) M5.5mm Hexagonal box driver

(4) M5mm Hexagonal box driver

5.3.2 RF Block Removal/Installation Procedures

(1) Remove all the connection cables from R3465

(2) Stand R3465 on the soft cushion to face down refers to Figure 5-3-1.

(3) Remove 6pcs of screws, and then pull main chassis off to up side.

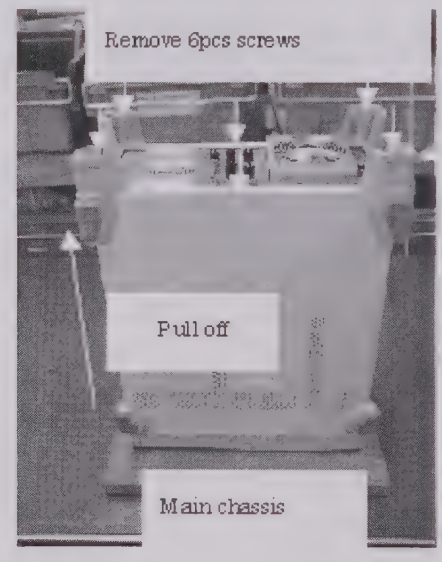

Figure 5-3-1 Removal of Main Chassis

(4) Remove side shield cover to remove cables, which are connected to RF block.

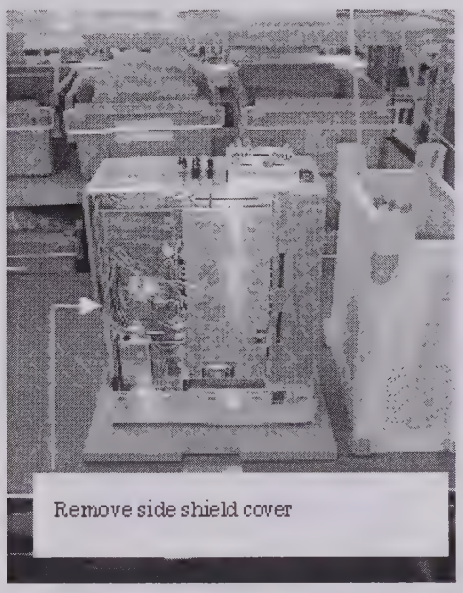

Figure 5-3-2 External View of R3465 and Location of Side Shield Cover

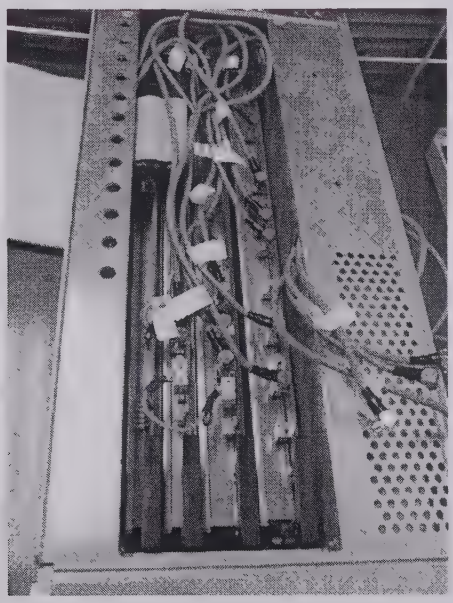

Figure 5-3-3 Removal of Cables

(5) Put R3465 up side down, face to bottom up.

Removal of front frame, front panel and RF block.

Remove 4pcs of hexagonal screws on both side panel and 10pcs of hexagonal nuts, which fixed RF block to main frame.

Locations of screws and nuts, refer to Figure 5-3-4

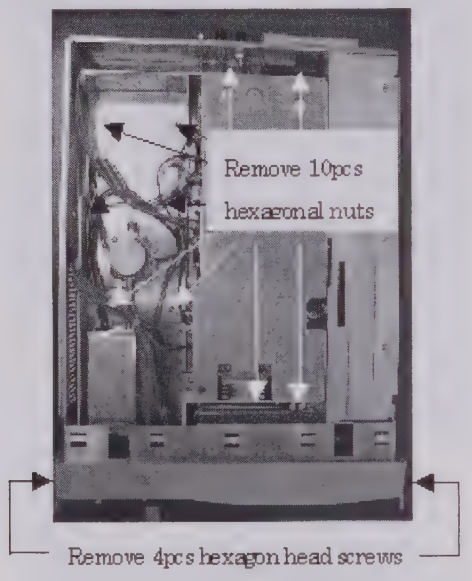

Figure 5-3-4 Location of Screws and Nuts

(6) After remove hexagonal head screws, pull front frame to front for removing.

Then remove 10pcs of screws on the top, down, left side and right side of front panel.

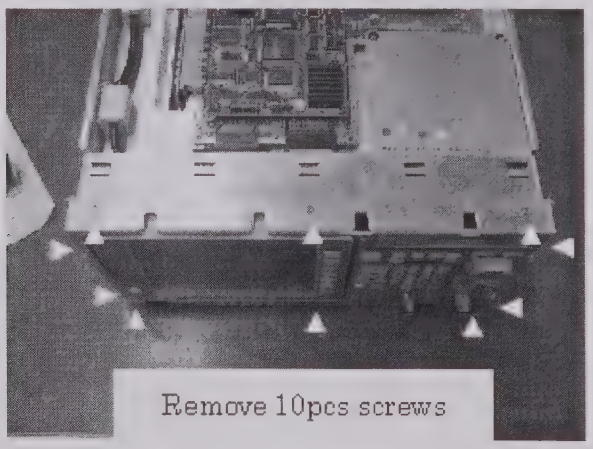

Figure 5-3-5 Location of Screws

(7) Remove front panel and 2pcs of screws under front panel.

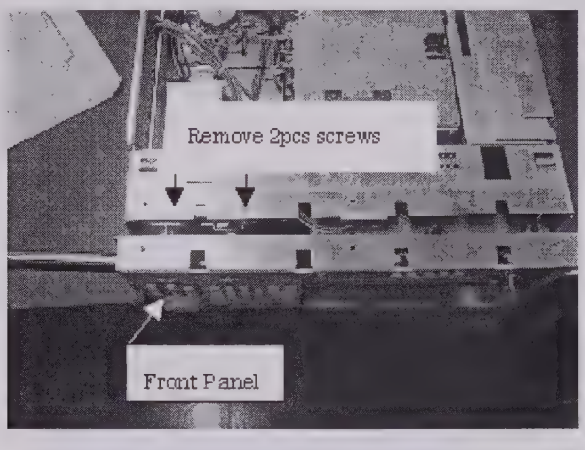

Figure 5-3-6 Location of Screws

(8) Remove RF Block

After remove screws, push RF Block to left and push back then remove RF Block.

Refer to Figure 5-3-7.

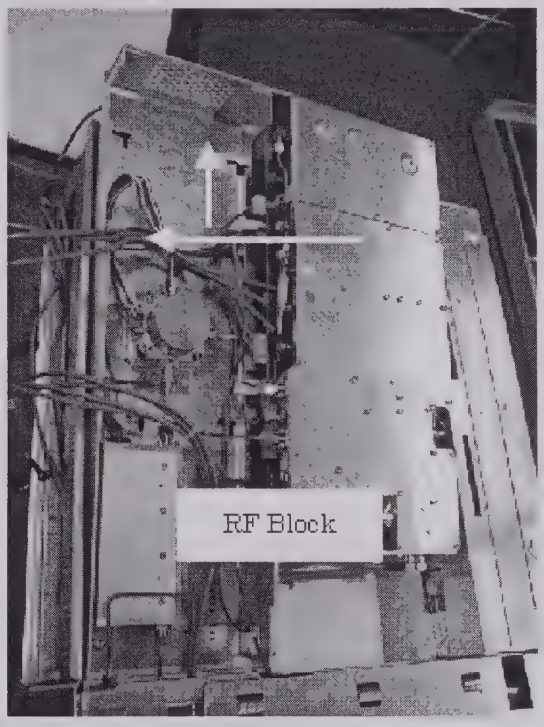

Figure 5-3-7 Removal of RF Block

(9) Replace defective block to new one, and then take reverse procedure for fixing back.

5.3.3 Synthesizer Block, IF Block, MOD Block and NADC Removal/Installation Procedures

(1) Take procedures 1) through 4) described in Section 5-3-2

(2) Block location is shown in Figure 5-3-8.

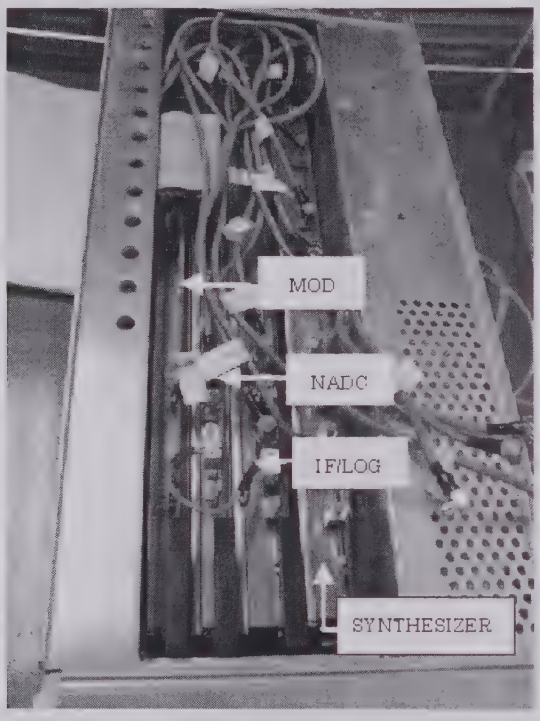

Figure 5-3-8 Location of Block

(3) After disconnect cables, pull defective block out by ejectors for removing, then replace to new one.

(4) Take reverse procedure for installation and fixing back.

5.3.4 CPU Block Removal/Installation Procedures

(1) Take procedures 1) through 4) described in Section 5-3-2

(2) Remove 3pcs of screws for removing CPU Block.

(3) Location of screws and CPU Block is shown in Figure 5-3-9

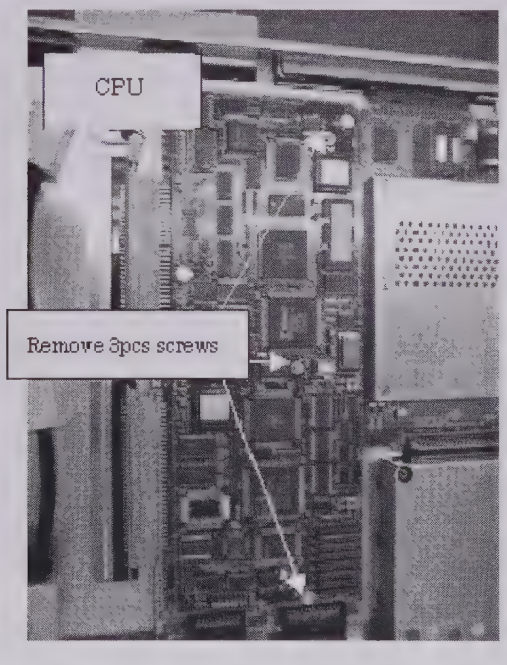

Figure 5-3-9 Location of Screws and CPU Block (Top View)

(4) Remove defective block, and then replace to new one.

(5) Take reverse procedure for installation and fixing back.

5.3.5 Memory Card Block Removal /Installation Procedures

(1) Take procedure 1) through 3) described section 5-3-4.

(2) Remove hexagonal space. Location of hexagonal spacer is shown Figure 5-3-10.

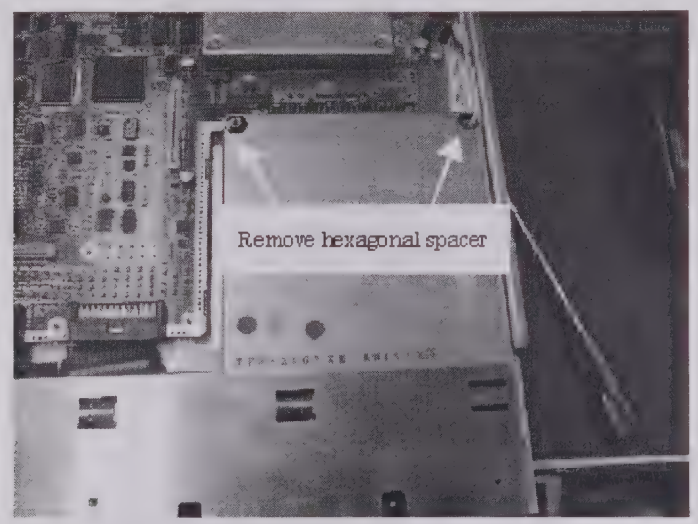

Figure 5-3-10 Location of hexagonal space

(3) After removal 2pcs of hexagonal spacer, pull Memory Card Block out toward to front.

(4) After remove defective block, replace to new one.

(5) Take reverse procedure for installation and fixing back.

5.3.6 TBC Block Removal/Installation Procedures

(1) Take procedures 1) through 3) described section 5-3-5 to remove Memory Card Block.

(2) Take procedures 2) through 3) described section 5-3-4 to remove TBC Block.

(3) Remove rear panel by removing 4pcs of screws.
Location of screws is referring to Figure 5-3-11.

Figure 5-3-11 Location of Screws on the Rear Panel

(4) Pull rear panel out.

(5) Remove 3pcs of hexagonal spacers and 8pcs of screws for removing TBC Block.
Location is referring to Figure 5-3-12.

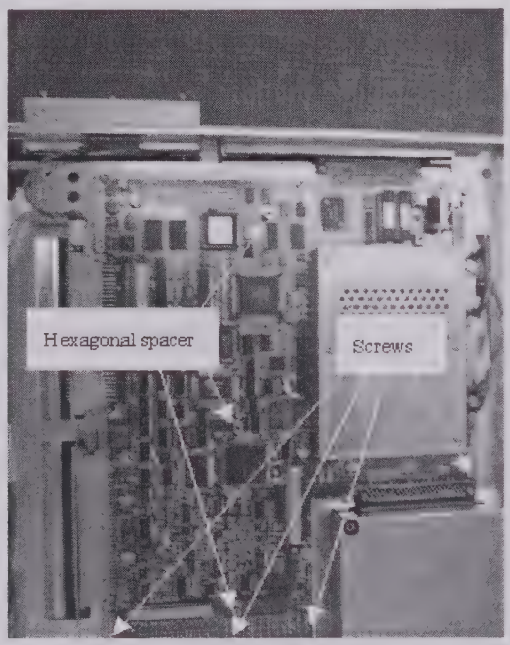

Figure 5-3-12 Location of Hexagonal Spacer and Screws

(6) Remove TBC Block, replace to new one.
Take reverse procedures for installation and fixing back.

5.3.7 Power Supply Block Removal/Installation Procedures

(1) Take procedures 1) through 3) described in Section 5-3-2.

(2) Remove 4pcs of hexagonal head screws both left and right side on the front frame. Location of hexagonal head screws, refer to Figure 5-3-13

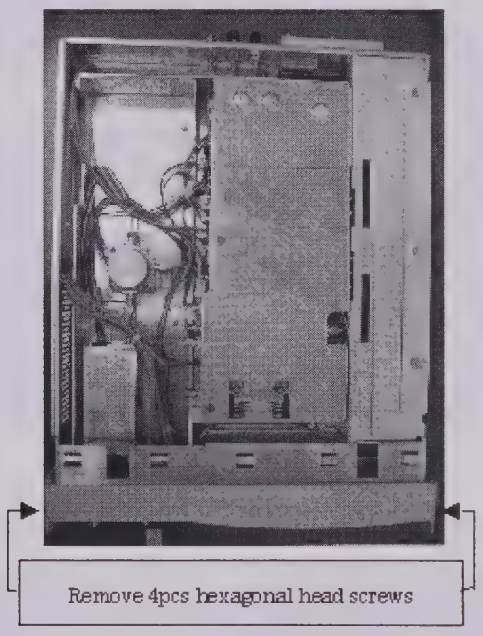

Figure 5-3-13 Location of Hexagonal Head Screws

(3) Remove front frame, and then remove 10pcs of screws on the front panel.
Location of screws is refers to Figure 5-3-14.

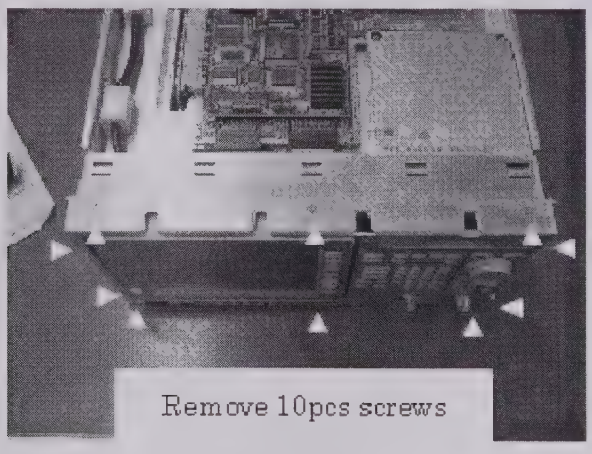

Figure 5-3-14 Location of 10pcs of Screws

(4) After remove 10pcs of screws, pull Front Panel out.
Remove flat cable from CPU Block to keyboard.
Refer to Figure 5-3-15

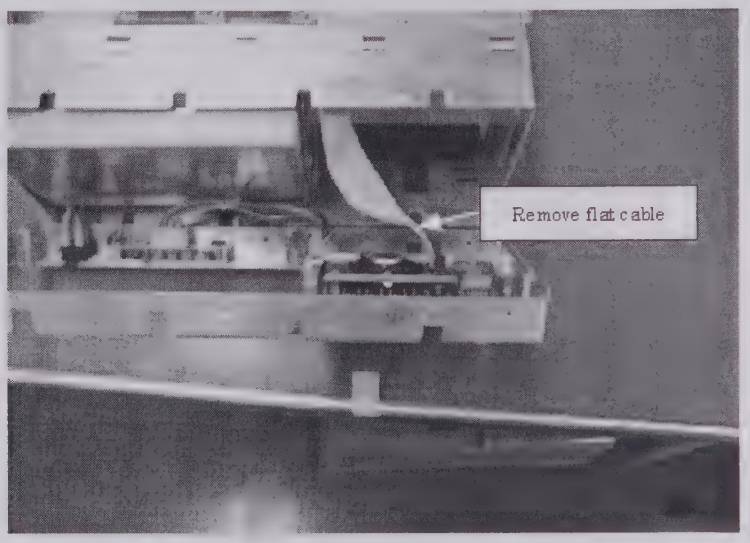

Figure 5-3-15 Flat Cable Connection

(5) Remove 4pcs of push on terminals from power switch, refer to Figure 5-3-16.

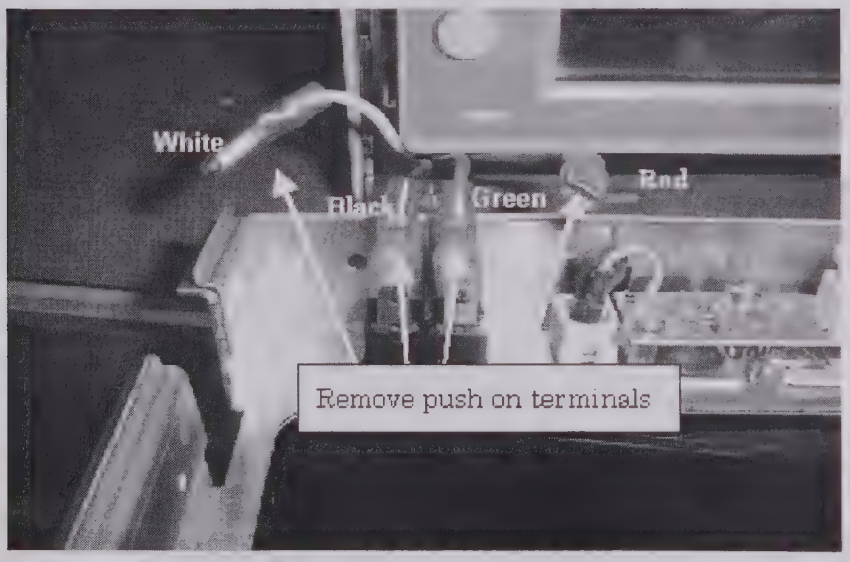

Figure 5-3-16 Push On Terminals at Power Switch

(6) Remove 3pcs of EMI clamper. referring Figure 5-3-17.
Lift the cable up for removing.

Figure 5-3-17 View of Clamper

(7) Remove 2pcs of power supplied cables and 6pcs of screws, referring Figure 5-3-18

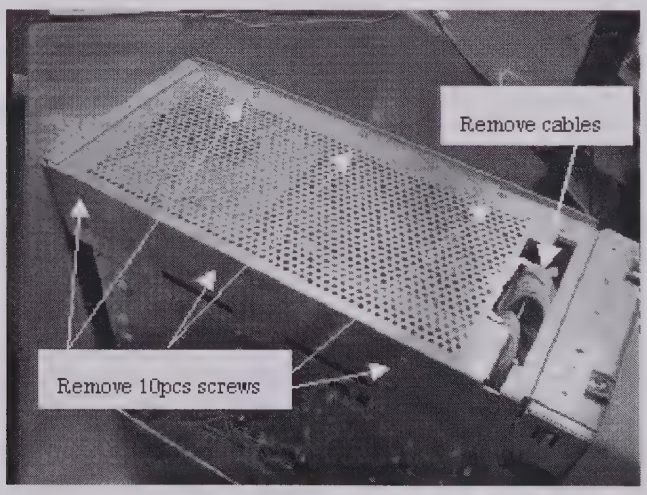

Figure 5-3-18 Location of Power Supplied Cables and Screws

(8) Remove 2pcs of screws on the rear panel.

Figure 5-3-19 Location of Screws

(9) Remove shield cover of Power Supply Block, then slide Power Supply Block toward to front. Lift front of Power Supply Block, then remove.

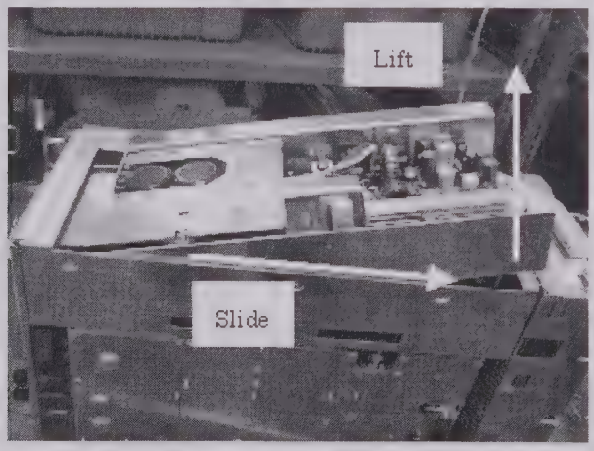

Figure 5-3-20 Removal of Shield Cover

(10) Replace defective block to new one, then take reverse procedures for installation and fixing back.

5.3.8 Display TFT Removal/Installation Procedures

(1) Take procedures 1) through 4) described in Section 5-3-7.

(2) Remove connector of flat cable on TBC Block, referring Figure 5-3-21.

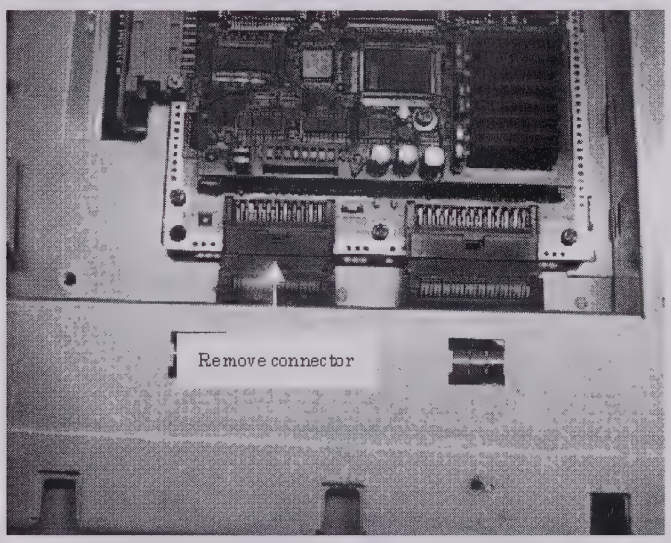

Figure 5-3-21 Location of Display Connector.

(3) Remove Display Block, referring Figure 5-3-22.

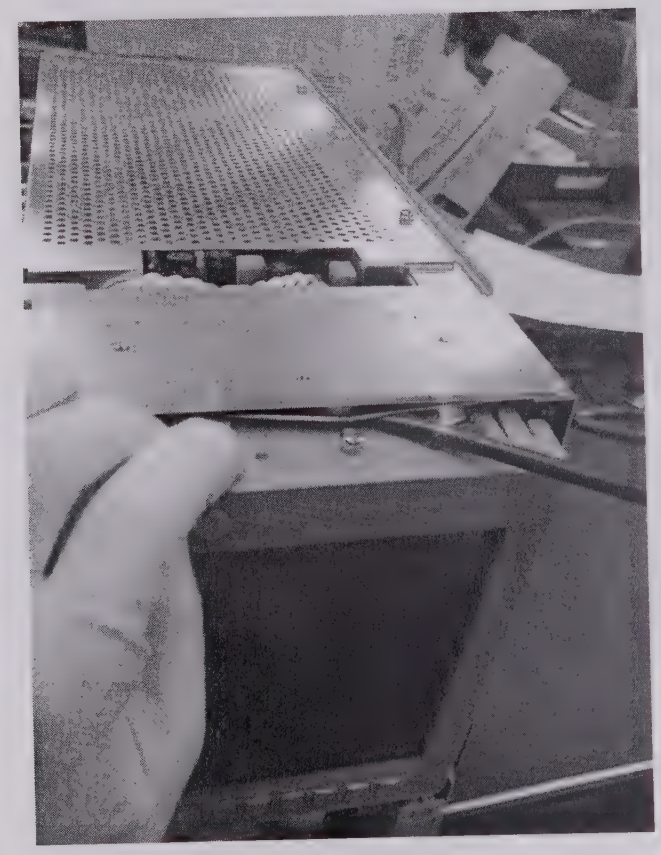

Figure 5-3-22 Removal of Display Block

(4) After remove Display Block, remove flat cable and 2pcs of screws, then remove TFT unit from TFT bezel, referring Figure 5-3-23. and Figure 5-3-24.

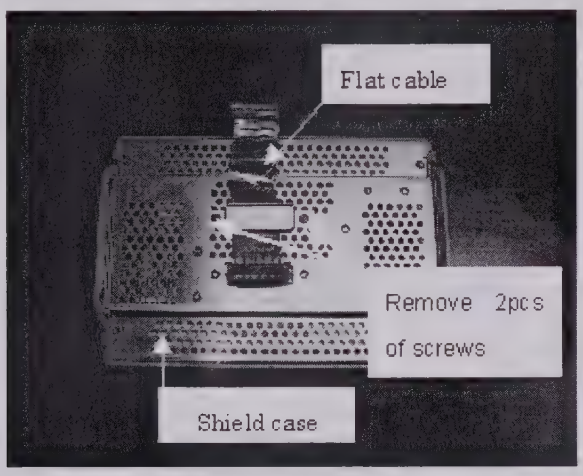

Figure 5-3-23 External View of Display Block

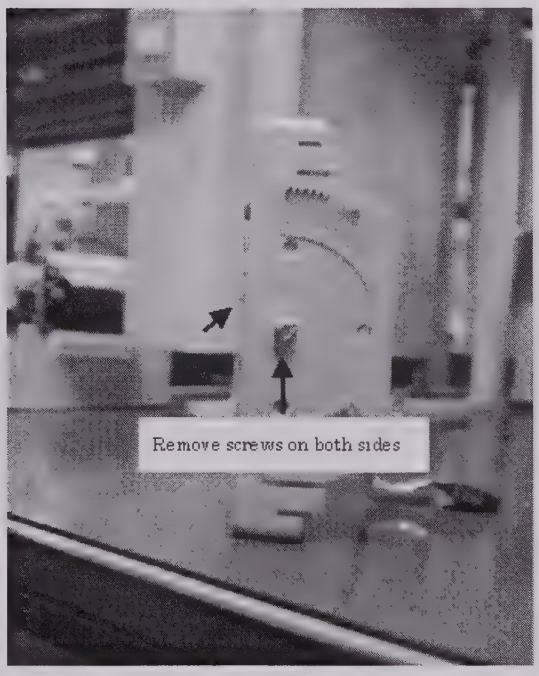

Figure 5-3-24 Location of Screws

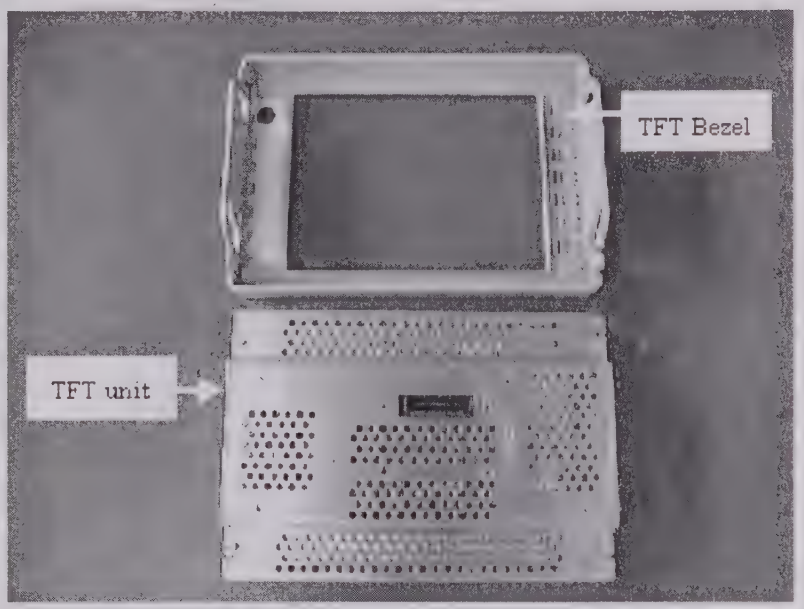

Figure 5-3-25 View of TFT unit and TFT Bezel

(5) Remove 4pcs of screws, referring Figure 5-3-26

Figure 5-3-26 Location of Screws

(6) Separate TFT and TFT unit, and then remove connection cable of backlights, referring Figure 5-3-27.

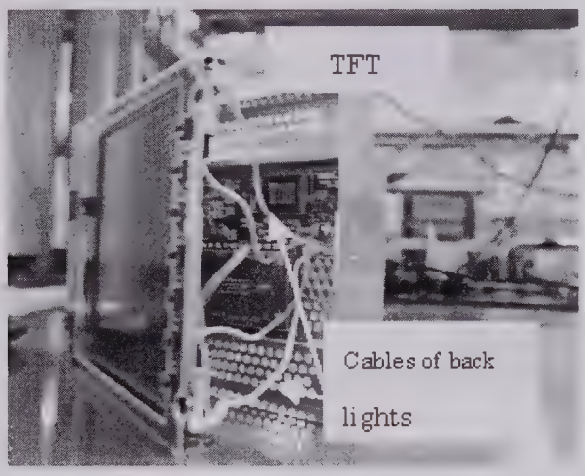

Figure 5-3-27 View of Connection Cable

(7) Remove 2pcs of cables and 7pcs of screws for removing TFT display, referring Figure 5-3-28.

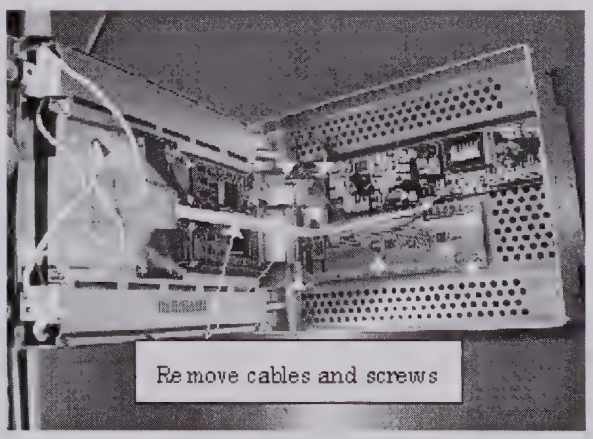

Figure 5-3-28 Remove Cables and Screws

(8) Remove flat cable for removing TFT display, referring Figure 5-3-29.

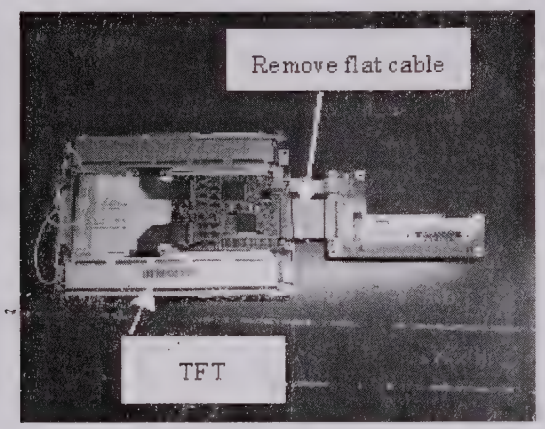

Figure 5-3-29 View of TFT

(9) Remove TFT display, replace defective TFT to new one.
Then, take reverse procedures for install and fixing back.

6 REPLACEABLE PARTS

6.1 Ordering Information.

To order a parts in the replaceable parts list, quote the description, the part code and quantity desired. Address the order to Advantest or representative of Advantest.

6.2 Replaceable Parts List

The R3465 replaceable parts are listed in Table 6-1.

Table 6-1 Replaceable Parts Listt

Parts Name	Part Code
RF Block	WBL-3465RF
IF/LOG Block	BLM-020385
MOD Block	BLM-021685X10
NADC Block	BLM-020992X10
TBC Block	BLM-020440
SYNTHE Block	BLM-020386
CPU Block	BLJ-021029
Power Supply unit	DPS-002862-1
MEMORY CARD	BLD-020473
Display	NLC-000295-1

WARRANTY

ADVANTEST product is warranted against defects in material and workmanship for a period of one year from the date of delivery to original buyer.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by buyer, unauthorized modification or misuse, accident or abnormal conditions of operations.

No other warranty is expressed or implied. ADVANTEST specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

ADVANTEST shall not be liable for any special incidental or consequential damages, whether in contract, tort or otherwise.

Any and all warranties are revoked if the product is removed from the country in which it was originally purchased.

SERVICE

During the warranty period, ADVANTEST will, at its option, either repair or replace products which prove to be defective.

When trouble occurs, buyer should contact his local supplier or ADVANTEST giving full details of the problem and the model name and serial number.

For the products returned to ADVANTEST for warranty service, buyer shall prepay shipping and transportation charges to ADVANTEST and ADVANTEST shall pay shipping and transportation charges to return the product to buyer. However, buyer shall pay all charges, duties, and taxes incurred in his country for products returned from ADVANTEST.

CLAIM FOR DAMAGE IN SHIPMENT TO ORIGINAL BUYER

The product should be thoroughly inspected immediately upon original delivery to buyer. All material in the container should be checked against the enclosed packing list or the instruction manual alternatively. ADVANTEST will not be responsible for shortage unless notified immediately.

If the product is damaged in any way, a claim should be filed by the buyer with carrier immediately. (To obtain a quotation to repair shipment damage, contact ADVANTEST or the local supplier.) Final claim and negotiations with the carrier must be completed by buyer.

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